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

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

South Dakota Public Utilities Commission Energy Facility Permit Application

June 2019

Contents

1.0 Introduction 1
1.1 Project Overview 1
1.2 Names of Participants, Owner, and Manager (ARSD 20:10:22:06 and ARSD 20:10:22:07) 2
1.3 Facility Permit Application Content and Organization 3
1.3.1 Completeness Checklist 4
2.0 Purpose of and Demand for the Facility (ARSD 20:10:22:08, 20:10:22:10) 13
2.1 Project Purpose 13
2.2 Project Demand 13
2.2.1 National Demand 13
2.2.2 Local Demand 14
2.2.3 Local Benefits 15
2.3 Consequences of Delay or Termination 15
3.0 Estimated Cost of Facility (ARSD 20:10:22:09) 16
4.0 General Site Description (ARSD 20:10:22:11) 17
4.1 General Site Description 17
4.2 Project Components Description 17
4.2.1 Wind Turbines 17
4.2.2 Access Roads 20
4.2.3 Collector Lines 20
4.2.4 Operations and Maintenance Facility 21
4.2.5 Project Substation 21
4.2.6 Communication Cables 21
4.2.7 Permanent Metrological Tower 22
4.2.8 Temporary Facilities 22
4.2.9 Crane Paths 22
4.2.10 Summary Land Requirements 23
4.2.10.1 Right-of-Way or Condemnation Requirements (ARSD 20:10:22:33.02 and 20:10:22:35) 23
4.3 Operation and Maintenance 24

5.0 Alternative Sites and Siting Criteria (ARSD 20:10:22:12) 25
5.1 Project Siting Criteria 25
5.1.1 Wind Energy Resource 25
5.1.2 Proximity to Transmission Infrastructure 25
5.1.3 Compatibility with Siting Requirements, Land use, and Environmental Features 26
5.1.4 Landowner Support 27
5.2 Site Configuration Alternatives 27
6.0 Environmental Information (ARSD 20:10:22:13) 28
6.1 Other Major Industrial Facilities under Regulation 28
7.0 Effects on Physical Environment (ARSD 20:10:22:14) 30
7.1 Geological Characteristics 30
7.1.1 Existing Geological Characteristics 30
7.1.1.1 Regional Landforms 30
7.1.1.2 Geological Features 31
7.1.1.3 Seismic Risks 32
7.1.1.4 Subsidence Potential 32
7.1.2 Impacts to Geological Resources 32
7.1.2.1 Regional Landforms 32
7.1.2.2 Geological Features 32
7.1.2.3 Economic Deposits 33
7.1.2.4 Seismic Risk 33
7.1.2.5 Subsidence Potential 33
7.1.3 Mitigation Measures for Geological Resources 33
7.2 Soil Resources 33
7.2.1 Existing Soil Resources 33
7.2.1.1 Prime Farmland 39
7.2.1.2 Drainage Class 40
7.2.1.3 Erosion Potential 41
7.2.1.4 Slope Gradient 41
7.2.2 Impacts to Soil Resources 42
7.2.2.1 Temporary Stabilization of Soils 43
7.2.2.2 Perimeter Sediment Controls 43
7.2.2.3 Vehicle Tracking BMPs 44
7.2.2.4 Erosion and Sediment Control BMP Maintenance 44

7.2.2.5 Revegetation 45
7.2.2.6 Additional BMPS 45
7.2.3 Mitigation Measures for Soil Resources 45
8.0 Hydrology (ARSD 20:10:22:15) 46
8.1 Groundwater Resources 46
8.1.1 Existing Groundwater Resources 46
8.1.2 Impacts to Groundwater Resources 47
8.1.3 Mitigation Measures for Groundwater Resources 47
8.2 Surface Water Resources 47
8.2.1 Existing Surface Water Resources 47
8.2.1.1 Waterbodies 47
8.2.1.2 Wetlands 48
8.2.1.3 Floodplains 48
8.2.1.4 National Park Service Nationwide Rivers Inventory 48
8.2.1.5 Impaired Waters 48
8.2.2 Impacts to Surface Water Resources 49
8.2.2.1 Waterbodies 49
8.2.2.2 Wetlands 50
8.2.2.3 Floodplains 51
8.2.2.4 National Park Service Nationwide Rivers Inventory 51
8.2.2.5 Impaired Waters 51
8.2.3 Mitigation Measures for Surface Water Resources 51
9.0 Effect on Terrestrial Ecosystems (ARSD 20:10:22:16) 52
9.1 Vegetation 52
9.1.1 Existing Vegetation 52
9.1.1.1 Grasslands and Native Prairie Communities 53
9.1.1.2 Conservation Easements 55
9.1.1.3 Special Status Species 55
9.1.1.4 Noxious and Invasive Weeds 55
9.1.2 Impacts to Vegetation 56
9.1.3 Mitigation Measures for Vegetation 57
9.2 Wildlife 57
9.2.1 Existing Wildlife 58
9.2.1.1 Migratory Birds 60

9.2.1.2 Raptors 62
9.2.1.3 Bats 66
9.2.1.4 Special Status Species 68
9.2.2 Wildlife Impacts/Mitigation 76
9.2.2.1 Migratory Birds 77
9.2.2.2 Raptors 80
9.2.2.3 Bats 80
9.2.2.4 Federally Listed Species 81
9.2.2.5 State-listed Species 82
9.2.2.6 Eagles 82
10.0 Effect on Aquatic Ecosystems (ARSD 20:10:22:17) 84
10.1 Existing Aquatic Ecosystems 84
10.1.1 Surface Water and Wetland Resources 84
10.1.2 Special Status Aquatic Species 84
10.1.2.1 Topeka Shiner 85
10.1.2.2 Banded Killifish 86
10.1.2.3 Northern Redbelly Dace 86
10.2 Aquatic Ecosystem Impacts/Mitigation 86
10.2.1 Special Status Aquatic Species 87
10.2.1.1 Topeka Shiner 87
10.2.1.2 Banded Killifish 87
10.2.1.3 Northern Redbelly Dace 88
11.0 Land Use (ARSD 20:10:22:18) 89
11.1 Land Use and Ownership 89
11.1.1 Existing Land Use and Ownership 89
11.1.2 Land Use Impacts 91
11.1.3 Mitigation Measures for Land Use 91
11.2 Recreation, Public Facilities, and Conservation Easements 92
11.2.1 Existing Recreation, Public Facilities, and Conservation Easements 92
11.2.2 Impacts to Recreation, Public Facilities, and Conservation Easements 92
11.2.3 Mitigation Measures for Recreation, Public Facilities, and Conservation Easements 93
11.3 Visual Resources 93
11.3.1 Existing Visual Resources 93
11.3.2 Impacts to Visual Resources 93

11.3.3 Mitigation Measures for Visual Resources 94
11.4 Electromagnetic Interference 94
11.4.1 Existing Communication Towers and Antennas 94
11.4.2 Microwave Paths 96
11.4.3 AM/FM 97
11.5 Sound 97
11.6 Shadow Flicker 100
12.0 Local Land Use Controls (ARSD 20:10:22:19) 102
13.0 Water Quality (ARSD 20:10:22:20) 104
13.1 Existing Water Quality 104
13.2 Water Quality Impacts 104
13.3 Mitigation Measures for Water Quality 105
14.0 Air Quality (ARSD 20:10:22:21) 106
14.1 Existing Air Quality 106
14.2 Air Quality Impacts 106
14.3 Mitigation Measures for Air Quality 107
15.0 Time Schedule (ARSD 20:10:22:22) 108
16.0 Community Impact (ARSD 20:10:22:23) 109
16.1 Socioeconomic and Community Resources 109
16.1.1 Existing Socioeconomic and Community Resources 109
16.1.2 Socioeconomic and Community Resource Impacts 110
16.1.2.1 Economic Impacts 110
16.1.3 Mitigation Measures for Socioeconomic and Community Resource Impacts 111
16.1.3.1 Population and Housing Impacts 111
16.1.3.2 Mitigation Measures for Population and Housing Impacts 112
16.2 Commercial, Industrial, and Agricultural Sectors 112
16.2.1 Existing Commercial, Industrial, and Agricultural Sectors 112
16.2.2 Commercial, Industrial, and Agricultural Sector Impacts 112
16.2.3 Mitigation Measures for Commercial, Industrial, and Agricultural Sectors 112
16.3 Community Facilities and Services 112
16.3.1 Existing Community Facilities and Services 112
16.3.2 Community Facilities and Services Impacts 113
16.3.3 Mitigation Measures for Community Facilities and Services Impacts 113
16.4 Transportation 113

16.4.1 Ground Transportation 113
16.4.1.1 Existing Ground Transportation 113
16.4.1.2 Ground Transportation Impacts 114
16.4.1.3 Mitigation Measures for Ground Transportation Impacts 114
16.4.2 Aviation 114
16.4.2.1 Existing Aviation 114
16.4.2.2 Aviation Impacts 115
16.4.2.3 Mitigation Measures for Aviation Impacts 115
16.5 Cultural Resources 115
16.5.1 Existing Cultural Resources 115
16.5.2 Impacts to Cultural Resources 119
16.5.3 Mitigation Measures for Cultural Resources 120
17.0 Employment Estimates (ARSD 20:10:22:24) 121
18.0 Future Additions and Modifications (ARSD 20:10:22:25) 123
19.0 Decommissioning of Wind Energy Facilities (ARSD 20:10:22:33.01) 124
20.0 Reliability and Safety (ARSD 20:10:22:33.02(8)) 125
20.1 Reliability 125
20.2 Safety 125
20.3 Electromagnetic Fields and Stray Voltage 126
21.0 Information Concerning Wind Energy Facilities (ARSD 20:10:22:33.02) 127
22.0 Additional Information in Application (ARSD 20:10:22:36) 129
22.1 Permits and Approvals 129
22.2 Agency Coordination 130
22.2.1 USFWS 130
22.2.2 SDDENR 131
22.2.3 SDGFP 131
22.2.4 SHPO 132
22.2.5 Deuel County 132
23.0 Testimony and Exhibits (ARSD 20:10:22:39) 133
23.1 Application Verification 133
24.0 References 134

List of Tables

Table 1-1 Completeness Checklist 5
Table 2-1 Levelized Cost of Electricity for New Generation Sources Entering Service in 2020 14
Table 4-1 Township, Sections, and Ranges within the Project Boundary 17
Table 4-2 Wind Turbine Specifications 18
Table 4-3 Summary of Land Requirements 23
Table 5-1 Summary of Distances and Setbacks Required 26
Table 7-1 Summary of the Soil Types in the Project Boundary 34
Table 7-2 Summary of Farmland Types and Impacts within the Project Boundary 40
Table 7-3 Summary of Soil Drainage Classifications within the Project Boundary 41
Table 7-4 Summary of Soil Slope Gradients within Project Boundary 42
Table 8-1 Summary of Project Waterbody Crossings 47
Table 8-2 Wetland Types Present within the Project Boundary 48
Table 8-3 Receiving Waters within One Mile of and that may Receive Stormwater Runoff from the Construction Areas 49
Table 8-4 Summary of Project Wetland Impacts 50
Table 9-1 Land Cover Types within the Project Boundary 53
Table 9-2 Noxious Weeds with Potential to Occur in the Project Area 56
Table 9-3 Summary of Wildlife Surveys Conducted at the Project 59
Table 9-4 Migratory Birds of Particular Concern near the Project 61
Table 9-5 Raptor Species with Potential to Occur within or near the Project 64
Table 9-6 Bat Species with Potential to Occur in or near the Project 67
Table 9-7 Federally Threatened and Endangered Species with Potential to Occur within or Near the Project 69
Table 10-1 Federally and State-listed Threatened and Endangered Species with Potential to Occur within or near the Project 85
Table 11-1 Land Cover Types within the Project Area 90
Table 11-2 Summary of Existing Residences within the Project Area and 1-Mile Buffer 90
Table 11-3 Summary of Federal Lands in Project Area 92
Table 11-4 Communication Towers near the Project 95
Table 11-5 Communication Antennas near the Project 96
Table 11-6 Summary of Microwave Path Analysis 97
Table 11-7 Summary of Predicted Sound Levels 99
Table 11-8 Summary of Predicted Duration of Shadow Flicker 101
Table 12-1 Applicable Setbacks and Siting Criteria 102
Table 15-1 Project Schedule 108
Table 16-1 Populations of Communities in the Project Vicinity 109
Table 16-2 Population Demographics 110
Table 16-3 Existing Road Types 113
Table 16-4 Previously Identified Archaeological Sites within One Mile of the Project 116

Table 16-5 Previously Identified Architectural Structures within One Mile of the Project 118
Table 16-6 Previously Inventoried Bridges within One Mile of the Project 119
Table 16-7 Previously Inventoried Bridges in the Study Area 119
Table 17-1 Estimated Construction Jobs and Employment Expenditures 121
Table 17-2 Estimated Annual Operation and Employment Expenditures 122
Table 19-1 Net Decommissioning Summary 124
Table 21-1 Information Concerning Wind Energy Facilities (ARSD 20:10:22:33.02) 128
Table 22-1 Permits and Approvals 129
Table 23-1 List of Individuals Providing Testimony 133

List of Figures

Figure 1 Project Boundary
Figure 2 Project Layout
Figure 3 Public Lands and Recreation
Figure 4 Surface Waters
Figure 5 Wind Turbine Design Features
Figure 6a-d Turbine Siting Ordinance Constraints Overview – Setbacks
Figure 7a-d Turbine Siting Ordinance Constraints Overview – Water Features
Figure 8 Location of Other Wind Energy Systems in the General Area
Figure 9 Surficial Geology
Figure 10 Bedrock Geology
Figure 11 Surficial Soil Map Unit Names
Figure 12 Wetlands
Figure 13 Land Cover
Figure 14 Prime Farmland Classifications

List of Appendices

Appendix A	Seeding Specfications
Appendix B	Aquatic Resources DesktopAssessment
Appendix C	Wetland Delineation Report
Appendix D	Dakota Skipper and Poweshiek Skipperline Survey Reports
Appendix E	Protected Species Agency Documentation
Appenidx F	Avian Use Report
Appendix G	Eagle and Raptor Nest Survey Reports
Appendix H	Northern Long-eared Bat Habitat Assessment
Appendix I	Northern Long-eared Bat Survey Report
Appendix J	Site Characterization Study
Appendix K	Communication Tower Study
Appendix L	Microwave Path Analysis
Appendix M	AM-FM Radio Report
Appendix N	Sound Modeling
Appendix O	Shadow Flicker Modeling
Appendix P	Deuel County Ordinance
Appendix Q	Decommissioning Plan
Appendix R	Agency Correspondence

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.

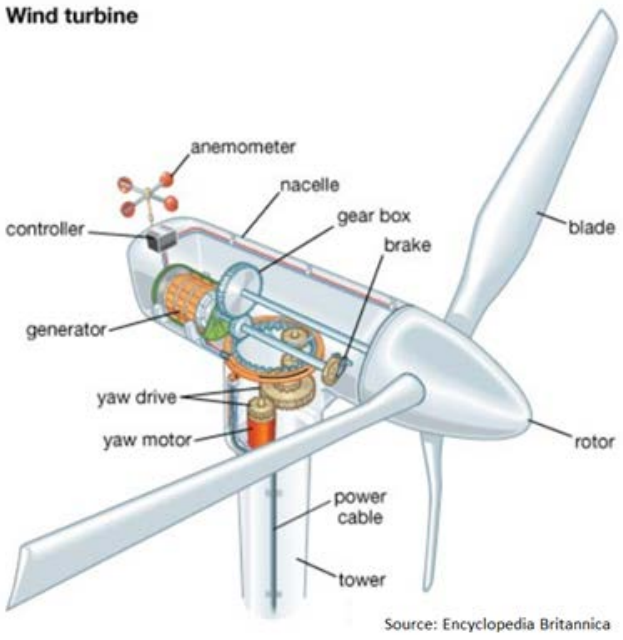
Table 4-2 Wind Turbine Specifications

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

24.0 References

American Wind Energy Association. (n.d.). *U.S. Wind Industry Annual Market Report, Year Ending 2018*. Retrieved from https://www.awea.org/resources/publications-and-reports/market-reports

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). Patterns of Bat Fatalities at Wind Energy Facilities in North America. *Journal of Wildlife Management, 72*(1), 61-78.

Audubon. (2018a). *Important Bird Areas*. Retrieved from https://www.audubon.org/important-bird-areas

Audubon. (2018b). *Important Bird Areas - Oakwood Lakes, South Dakota*. Retrieved from https://www.audubon.org/important-bird-areas/oakwood-lakes

Audubon. (2018c). *Important Bird Areas - Prairie Coteau, Minnesota*. Retrieved from https://www.audubon.org/important-bird-areas/prairie-coteau

AWS Truepower, LLC. (2010, October 8). South Datkota - Annual Average Wind Speed at 80 m. Retrieved from https://windexchange.energy.gov/files/u/visualization/pdf/sd_80m.pdf

Baker, A.J., P. Gonzalez, R.I.G. Morrison, and B.A. Harrington. (2013). Red Knot (Calidris canutus). The Birds of America Online. Cornell Lab of Ornithology. (A. Poole, Ed.) Ithaca, New York.

Bat Conservation International. (2019). *Species Profiles*. Retrieved June 9, 2019, from http://www.batcon.org/resources/media-education/species-profiles

Bauman, P., B. Carlson, and T. Butler. (2016). *Quantifying Undisturbed (Native) Lands in Eastern South Dakota: 2013. October 2016.* South Dakota State University, Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange; Natural Resource Management Data Sets. Retrieved from https://openprairie.sdstate.edu/cgi/viewcontent.cgi?article=1000&context=data_land-easternSD

Breiman, L. (2001, October). Random Forests. *Machine Learning, 45*(1), 5-32. Retrieved from https://link.springer.com/article/10.1023%2FA%3A1010933404324

Bryce, S., J.M. Omernik, D.E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S.H. Azevedo. (1998). *Ecoregions of North Dakota and South Dakota, Ver. Nov. 30, 1998.* Jamestown: Northern Prairie Wildlife Research Center. Retrieved June 6, 2019, from http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/index.htm

Cryan, P.M. (2003). Seasonal Distribution of Migratory Tree Bats (Lasiurus and Lasionycteris) in North America. *Journal of Mammalogy, 84*(2), 579-593.

Derby, C., A. Dahl, A. Merrill, and K. Bay. (2010). *2009 Post-Construction Monitoring Results for the Wessington Springs Wind-Energy Facility, South Dakota. Final Report. Prepared for Wessington Wind Energy Center, LLC, Juno Beach, FL. Prepared by Western EcoSystems Technology, Bismarck, ND. Aug. 19, 2010.*

Derby, C., A. Dahl, K. Bay, and L. McManus. (2011). *2010 Post-Construction Monitoring Results for the Wessington Springs Wind-Energy Facility, South Dakota. Final Report: Mar. 9-Nov. 16, 2010. Prepared by Western EcoSystems Technology, Inc., Bismarck, ND. August 19, 2010.*

eBird. (2018). eBird. *An Online Database of Bird Distribution and Abundance*. Ithaca, New York. Retrieved from eBird: An Online Database of Bird Distribution and Abundance. Cornell Lab of Ornithology, Ithaca, New York: http://ebird.org/content/ebird/

eBird. (2019, May). *eBird: An Online Database of Bird Distribution and Abundance, Cornell Lab of Ornithology, Ithaca, New York*. Retrieved from http://ebird.org/content/ebird/

Esri. (2018). *World Imagery and Aerial Photos.* Retrieved from ArcGIS Resource Center; Esri, producers of ArcGIS software. Redlands, California: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

Esri. (2019). *Conservation Easements*. Retrieved from ArcGIS Resource Center; Esri, producers of ArcGIS software. Redlands, California: https://www.arcgis.com/home/search.html?t=content&q=tags%3AConservation%20Easement&start=1&num=20

European Space Agency. (2017). *Copernicus - Sentinel data for 2017*. Retrieved from ESA Sentinel Online: https://sentinel.esa.int/web/sentinel/sentinel-data-access

Federal Register. (2015). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Dakota Skipper and Poweshiek Skipperling; Final Rule 50 CFR Part 17. Department of the Interior, Fish and Wildlife Service. October 1, 2015. *Vol. 80, No. 190*, 59248-59384. Retrieved from https://www.fws.gov/midwest/endangered/insects/dask/pdf/FRFinalCH1Oct2015.pdf

Federal Register. (2016). Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-eared Bat; Final Rule 50 CFR Part 17. Department of the Interior, Fish and Wildlife Service. January 14, 2016. *Vol. 81, No. 9*, 1900-1922. Retrieved from http://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf

Foster, R.W. and A. Kurta. (1999). Roosting Ecology of the Northern Bat (Myotis septentrionalis) and Comparisons with the Endangered Indiana Bat (Myotis sodalis). *Journal of Mammalogy, 80*(2), 659-672.

Gage, A.M., S.K. Olimb, and J. Nelson. (2016). Plowprint: Tracking Cumulative Cropland Expansion to Target Grassland Conservation. *Great Plains Research, 26*, 107-116. Retrieved June 6, 2019, from

https://www.researchgate.net/publication/311003124_Plowprint_Tracking_Cumulative_Cropland_Expansion_to_Target_Grassland_Conservation

Grindal, S.D., J.L. Morissette, and R.M. Brigham. (1999). Concentration of Bat Activity in Riparian Habitats over an Elevational Gradient. *Canadian Journal of Zoology, 77*(6), 972-977. doi:10.1139/z99-062

Gruver, J., K. Bay, M. Kesterke, W. Erickson, K. Murray, and M. Ritzert. (2011, February 23-25). A Summary of Bat Studies and Fatalities from Wind Energy Facilities in the United States with an Emphasis on the Midwest. *Oral Presentation (invited) given to the 2nd Joint Meeting Northeastern Bat Working Group, Midwest Bat Working Group, Southeastern Bat Diversity Network, and 21st Colloquium on the Conservation of Mammals in the Eastern United States*. Louisville, Kentucky.

Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson. (2009). *Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, WI, July 21-Oct. 31, 2008 and March 15-June 4, 2009. Unpublished report prepared by Western EcoSystems Technology; Cheyenne, WY. Dec 17, 2009.*

Harvey, M.J., J.S. Altenbach, and T.L. Best. (2011). Bats of the United States and Canada. Baltimore, Maryland: The Johns Hopkins University Press.

Henderson, L.E. and H.G. Broders. (2008). Movements and Resource Selection of the Northern Long-Eared Myotis (Myotis septentrionalis) in a Forest-Agriculture Landscape. *Journal of Mammalogy, 89*, 952-963.

Hoen, B., J. Brown, T. Jackson, R. Wiser, M. Thayer and P. Cappers. (2013, August). A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Environmental Energy Technologies Division. Retrieved from http://emp.lbl.gov/reports/re

Hoen, B., R. Wiser, P. Cappers, M. Thayer, and G. Sethi. (2009, December). The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis. Environmental Energy Technologies Division.

Homer, C., J. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. Herold, J. Wickham, K. Megown. (2015, May 1). Completion of the 2011 National Land Cover Database for the Conterminous United States - Representing a Decade of Land Cover Change Information. *Photogrammetric Engineering & Remote Sensing, 81*(5), 345-354(10).

Howell, J.A. and J. Noone. (1992). *Examination of Avian Use and Mortality at a U.S. Windpower Wind Energy Development Site, Montezuma Hills, Solano County, California. Final Report. Prepared for Solano County Dept. of Environmental Management, Fairfield, California.*

International Union for Conservation of Nature. (2019). *The IUCN Red List of Threatened Species*. Retrieved June 9, 2019, from https://www.iucnredlist.org/

Jensen, A. R. (2001, June 29). First Occurrence of Aquifer Materials in Deuel County, South Dakota. *Auifer Materials Map 7*. South Dakota Department of Environment and Natural Resources Division Geological Survey. Retrieved from http://www.sdgs.usd.edu/pubs/pdf/AM-07_20010629.pdf

Johnson, G.D. (2005). A Review of Bat Mortality at Wind-Energy Developments in the United States. *Bat Research News, 46*(2), 45-49.

Kiesow, A.M. and C.D. Dieter. (2005). Availability of Suitable Habitat for Northern River Otters in South Dakota. *Great Plains Research: A Journal of Natural and Social Sciences, 740*. Retrieved from https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1738&context=greatplainsresearch

Kochert, M.N., K. Steenhof, C.L. McIntyre, and E.H. Craig. (2002). Golden Eagle (Aquila chrysaetos), Version 2.0. In the Birds of North America. Cornell Lab of Ornithology. Ithaca, New York. Retrieved from https://doi.org/10.2173/bna.684

Kritz, K., M. Rheude, B. Millsap, M. Sadlowski, J. Pagel, M. Stuber, C. Borgman, T. Wittig, U. Kirkpatrick, J. Muir, and H. Beeler. (2018). Bald Eagle Mortalities and Injuries at Wind Energy Facilities in the United States. *Poster presented at The Wildlife Society meeting in Cleveland, Ohio on October 8, 2019*.

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). Ecological Impacts of Wind Energy Development on Bats: Questions, Hypotheses, and Research Needs. In press. *Frontiers in Ecology and the Environment, 5*.

Lausen, C. (2009). *Status of the Northern Myotis (Myotis septentrionalis) in Alberta. Alberta Wildlife Status Report No. 3 (Update 2009) May.* Alberta Conservation Association. Retrieved from https://www.ab-conservation.com/downloads/AWSR/Mammal%20Reports/Status%20of%20Northern%20Myotis%20in%20Alberta_udpate%202009.pdf

Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr. (1980). *Atlas of North American Freshwater Fishes.* Raleigh: North Carolina State Museum of Natural Sciences.

Liguori, J. (2005). *Hawks from Every Angle: How to Identify Raptors in Flight, September 2005.* Princeton University Press.

Martin, J. E., Sawyer, J. F., Fahrenbach, M. D., Tomhave, D. W., & Schulz, L. D. (2004). Geologic Map of South Dakota - General Map 10. South Dakota Geological Survey. Retrieved from http://www.sdgs.usd.edu/pubs/pdf/G-10.pdf

Multi-Resolution Land Characteristics Consortium (MRLC). (n.d.). *National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center. Soux Falls, South Dakota.* Retrieved June 9, 2019, from https://www.mrlc.gov/data

National Park Service. (n.d.). *Nationwide Rivers Inventory*. Retrieved 2019, from https://www.nps.gov/maps/full.html?mapId=8adbe798-0d7e-40fb-bd48-225513d64977

National Renewable Energy Laboratory. (2018, April). 2017 State of Wind Development in the United States by Region.

National Wind Coordinating Committee. (2004). Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions. Fact Sheet: Second Edition. November 2004. Retrieved from https://tethys.pnnl.gov/sites/default/files/publications/Wind_Turbine_Interactions_with_Birds_and_Bats.pdf

NatureServe. (2019). *National Species Dataset: Species Population Location Information for Informed Decisions, Modeling, and Analysis*. Retrieved from NatureServe: http://www.natureserve.org/conservation-tools/national-species-dataset

Nebraska Game and Parks Commission (NGPC). (2010). *Nebraska's At-Risk Wildlife, Wildlife Division Publication*. Lincoln.

Ohio Department of Natural Resources. (2018). *Western Banded Killifish (Fundulus diaphanus)*. Retrieved from Division of Wildlife: http://wildlife.ohiodnr.gov/species-and-habitats/species-guide-index/fish/western-banded-killifish

Pagel, J.E., D.M. Whittington, and G.T. Allen. (2010). *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. U.S. Fish and Wildlife Service. February 2010.* Retrieved from http://steinadlerschutz.lbv.de/fileadmin/www.steinadlerschutz.de/terimGoldenEagleTechnicalGuidanceProtocols25March2010_1_.pdf

Pardieck, K.L., D.J. Ziolkowski, Jr., M. Lutmerding, and M.A.R. Hudson. (2018). *North American Breeding Bird Survey Dataset 1966-2017, Version 2017.0*. Retrieved from U.S. Geological Survey, Patuxent Wildlife Research Center: www.pwrc.usgs.gov/BBS/RawData/

Partners in Flight. (2019). *Landbird Population Estimates Database 3.0*. Retrieved from http://pif.birdconservancy.org/PopEstimates

Pasbrig, C. (2014). The Glacial Relict Fishes of South Dakota's Sandhills. *American Currents, 39*(1), 29-30.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. (1980). A Variable Circular-Plot Method for Estimating Bird Numbers. *Condor, 82*(3), 309-313.

Rigney, C.L. (2013). Habitat Characterization and Biology of the Threatened Dakota Skipper (Hesperia dacotae) in Manitoba. Masters of Science. Manitoba, Canada: The University of Winnipeg. Retrieved from http://winnspace.uwinnipeg.ca/handle/10680/576

Royer, R. and G.M. Marrone. (1992a). Conservation Status of the Poweshiek Skipper (Oarisma poweshiek) in North and South Dakota. March 15, 1992. Denver, Colorado: Fish and Wildlife Service.

Royer, R. and G.M. Marrone. (1992b). Conservation Status of the Dakota Skipper (Hesperia dacotae) in North and South Dakota. March 15, 1992. Denver, Colorado: U.S. Fish and Wildlife Service.

Selby, G. (2013). U.S. Fish and Wildlife Service Region 3, 2012 Minnesota Prairie Butterfly Surveys, Final Report. January 31, 2013. Bloomington, Minnesota: U.S. Fish and Wildlife Service, Twin Cities Field Office.

Shaffer, J.A. and D.A. Buhl. (2015). *Effects of Wind-Energy Facilities on Breeding Grassland Bird Distributions*. Retrieved from https://doi.org/10.1111/cobi.12569

Skadsen, D.R. (2003). Dakota Skipper Population Surveys for CCAA Development in the State of South Dakota. Report 2003-20. December 31, 2003. Pierre: South Dakota Department of Game, Fish, and Parks Wildlife Division.

Soil Science Division Staff. (2017, March). Soil Survey Manual. *USDA Handbook 18*. (C. Ditzler, K. Scheffe, & H. C. Monger, Eds.) Washington, D.C.: Government Printing Office.

South Dakota DENR - Geological Survey Program. (n.d.). *Oil and Gas Resources*. Retrieved April 2019, from http://usd.maps.arcgis.com/apps/webappviewer/index.html?id=9888ec2e3ee844998385265dfa22e449&center=-100.33,%2044.36.

South Dakota DENR. (n.d.). *Sand, Gravel, and Construction Aggregate Mining*. Retrieved April 2019, from https://arcgis.sd.gov/server/denr/conagg/

South Dakota Department of Agriculture. (2017). South Dakota Summary of Plant Protection Regulations; Updated October 2017. Retrieved from https://nationalplantboard.org/wp-content/uploads/docs/summaries/south_dakota.doc

South Dakota Department of Agriculture. (2018a). South Dakota Locally Noxious Weed Pest List. Retrieved from https://sdda.sd.gov/ag-services/weed-and-pest-control/weed-pest-control/LOCALLY_Noxious%2004162018.pdf

South Dakota Department of Agriculture. (2018b). *State Noxious Weed & Pest List*. Retrieved from https://sdda.sd.gov/ag-services/weed-and-pest-control/weed-pest-control/sd-state-noxious-weed-declared-pest-list-and-distribution-maps/default.aspx

South Dakota Dept. of Labor & Regulation. (n.d.). Retrieved 6 2019, June, from https://www.southdakotaworks.org/vosnet/Default.aspx

South Dakota Game, Fish and Parks (SDGFP). (2003). *Topeka Shiner (Notropis Topeka) Management Plan for the State of South Dakota. Wildlife Division Report No. 2003-10. SDGFP, Pierre, South Dakota.*

Summer 2003. 82 pp. Retrieved June 6, 2019, from http://gfp.sd.gov/wildlife/critters/fish/rare-fish/docs/TopekaShinerManagementPlan-Revised.pdf

South Dakota Game, Fish and Parks (SDGFP). (2006). *Fragile Legacy: Rare Animals of South Dakota. Wildlife Division Publication. South Dakota Department of Game, Fish and Parks, Pierre*.

South Dakota Game, Fish and Parks (SDGFP). (2018). State T&E Species Status Reviews, Approved by SDGFP Commission 5 April 2018. Retrieved June 6, 2019, from South Dakota Game, Fish and Parks: https://gfp.sd.gov/UserDocs/nav/status-reviews.pdf

South Dakota Geological Survey. (n.d.). *Earthquakes in South Dakota (1872 - 2013).* Retrieved 2019, from Publications & Maps.

South Dakota Public Utilities Commission. (2017). *Commission Dockets*. Retrieved from EL 17-042 - In the Matter of the Application of Otter Tail Power Company for an Energy Conservation Facility Permit for the Construction of a Combustion Turbine Generator and Associated Infrastructure Including a Natural Gas Pipeline: http://puc.sd.gov/Dockets/Electric/2017/el17-042.aspx

Tierney, R. (2009). *Buffalo Gap 2 Wind Farm Avian Mortality Study, July 2007-December 2008, Final Survey Report; No. 151143-B-01. June 2009. Submitted by TRC.* Albuquerque, New Mexico.

U.S. Army Corps of Engineers Research and Development Center. (2010, March). Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0) (ERDC/EL TR-10-1). Vicksburg, MS.

U.S. Department of Agriculture. (2001). Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Handbook. Prepared by the USDA RUSLE Development Team. March 2001. Retrieved from https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_025079.pdf

U.S. Department of Agriculture. (2011). *Identification of Important Farmland; January 31, 2011*. Retrieved May 27, 2019, from Natural Resources Conservation Service: https://prod.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_010970.pdf

U.S. Department of Agriculture. (2016). *Imagery Programs - National Agriculture Imagery Program (NAIP). USDA - Farm Service Agency (FSA). Aerial Photography Field Office (APFO). December 2016*. Retrieved December, from http://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

U.S. Department of Agriculture. (2017a). *Publications; 2017 Agricultural Statistics Annual*. Retrieved from National Agricultural Statistics Service: https://www.nass.usda.gov/Publications/Ag_Statistics/2017/index.php

U.S. Department of Agriculture. (2017b). *Web Soil Survey (August 21, 2017)*. Retrieved April 2019, from Natural Resources Conservation Service: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

U.S. Department of Agriculture. (2019a). *2017 Census of Agriculture, South Dakota State and County Data, Vol. 1, Geographic Area Series, Part 41, Issued April 2019*. Retrieved June 6, 2019, from https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/South_Dakota/sdv1.pdf

U.S. Department of Agriculture. (2019b). *Soil Data Access, Query Services for Custom Access to Soil Data*. Retrieved February 11, 2019, from Natural Resources Conservation Service: https://sdmdataaccess.sc.egov.usda.gov

U.S. Department of the Interior. (2017). Memorandum: The Migratory Bird Treaty Act Does Not Prohibit Incidental Take; 41 pp. December 22, 2017. Washington, DC: Officer of the Solicitor.

U.S. Energy Information Administration. (2019a). *Annual Energy Outlook 2019 (January 24, 2019)*. Retrieved from https://www.eia.gov/outlooks/aeo

U.S. Energy Information Administration. (2019b). Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2019 (February 2019). Retrieved from https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

U.S. Energy Information Administration. (2019c). *South Dakota State Profile and Energy Estimates (Last Updated March 21, 2019)*. Retrieved from https://www.eia.gov/state/?sid=SD

U.S. Environmental Protection Agency. (2016). *Level III and IV Ecoregions of the Continental United States*. Retrieved from https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states

U.S. Environmental Protection Agency. (2019a). *Green Book; Counties Designated "Nonattainment" (April 30, 2019)*. Retrieved May 27, 2019, from EPA: https://www3.epa.gov/airquality/greenbook/mapnpoll.html

U.S. Environmental Protection Agency. (2019b). *Reviewing National Ambient Air Quality Standards (NAAQS): Scientific and Technical Information*. Retrieved June 6, 2019, from https://www.epa.gov/naaqs

U.S. Fish and Wildlife Service. (2008). *Birds of Conservation Concern 2008*. U.S. Department of Interior, Arlington. Retrieved from https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

U.S. Fish and Wildlife Service. (2012). *Land-based Wind Energy Guidelines; March 23, 2012*. Retrieved from http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

U.S. Fish and Wildlife Service. (2013a). *Dakota Tallgrass Prairie, Wildlife Management Area/North Dakota and South Dakota*. Retrieved from https://www.fws.gov/refuge/Dakota_Tallgrass_Prairie/wildlife_and_habitat/index.html

U.S. Fish and Wildlife Service. (2013b). Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy (Version 2); April 2013. Retrieved from https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

U.S. Fish and Wildlife Service. (2013c). Northern Long-Eared Bat (Myotis septentrionalis). Fact Sheet, September 2013.

U.S. Fish and Wildlife Service. (2013d). Rufa Red Knot (Calidris canutus rufa). Fact Sheet. September 2013. Retrieved from https://www.fws.gov/northeast/redknot/pdf/Redknot_BWfactsheet092013.pdf

U.S. Fish and Wildlife Service. (2014a). *Northern Long-Eared Bat Interim Conference and Planning Guide; USFWS Regions 2, 3, 4, 5, & 6. January 6, 2014.* Retrieved from http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

U.S. Fish and Wildlife Service. (2014b). Poweshiek Skipperling (Oarisma poweshiek). Fact Sheet. Updated October 2014. Retrieved from https://www.fws.gov/midwest/endangered/insects/posk/PoweshiekSkipperlingFactSheet.html

U.S. Fish and Wildlife Service. (2014c). Poweshiek Skipperling (Oarisma poweshiek), Midwest Region. Fact Sheet. October 2014.

U.S. Fish and Wildlife Service. (2016). Guidance for Interagency Cooperation under Section 7(a)(2) of the Endangered Species Act for the Dakota Skipper, Dakota Skipper Critical Habitat,and Poweshiek Skipperling Critical Habitat, Version 1.1, May 2016.

U.S. Fish and Wildlife Service. (2018a). Email correspondence between Natoma Hansen (USFWS, Project Leader) and Amanda Bohnenblust (Avangrid, Senior Permitting Manager).

U.S. Fish and Wildlife Service. (2018b). Guidance on the Recent M-Opinion Affecting the Migratory Bird Treaty Act. April 11, 2018.

U.S. Fish and Wildlife Service. (2018c). Midwest Region Endangered Species; Dakota Skipper (Hesperia dacotae). North Dakota Survey Protocol, Mountain-Prairie Region. Retrieved from www.fws.gov/midwest/endangered/insects/dask/index.html

U.S. Fish and Wildlife Service. (2018d). Northern Long-eared Bat Final 4(d) Rule; White-Nose Syndrome Zone Around WNS/Pd Positive Counties/Districts. Oct. 1, 2018. Retrieved from https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf

U.S. Fish and Wildlife Service. (2019a). *USFWS Geospatial Services; National GIS Data*. Retrieved from U.S. Fish and Wildlife Service: https://www.fws.gov/gis/data/national/

U.S. Fish and Wildlife Service. (2019b). Midwest Region Endangered Species; Dakota Skipper (Hersperia dacotae). Fact Sheet. Last updated May 29, 2019. Retrieved from https://www.fws.gov/midwest/endangered/insects/dask/daskFactSheet.html

U.S. Fish and Wildlife Service. (2019c). *Midwest Regional Endangered Species; Topeka Shiner (Notropis topeka). Last updated: May 29, 2019*. Retrieved from https://www.fws.gov/midwest/endangered/fishes/topekashiner/index.html

U.S. Fish and Wildlife Service. (2019d). *National Wetlands Inventory*. Retrieved May 27, 2019, from U.S. Fish and Wildlife Service: http://www.fws.gov/wetlands/

U.S. Fish and Wildlife Service. (2019e). *Range-Wide Indiana Bat Suvey Guidelines. April 2019.* Retrieved from https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2019_Rangewide_IBat_Survey_Guidelines.pdf

U.S. Fish and Wildlife Service. (2019f). Recovery Outline for the Rufa Red Knot (Calidris canutus rufa). March 2019. Retrieved from https://ecos.fws.gov/docs/recovery_plan/20190409%20Red%20Knot%20Recovery%20Outline%20final%20signed.pdf

U.S. Fish and Wildlife Service. (2019g). *USFWS National Cadastral Data; FWS Interest Lands, March 2019*. Retrieved from USFWS Geospatial Services: https://www.fws.gov/gis/data/cadastraldb/links_cadastral.html

U.S. Geological Survey. (2003). U.S. Aquifer Map. Retrieved from https://water.usgs.gov/ogw/aquifer/USAaquiferMAP11_17.pdf

U.S. Geological Survey. (2011). *Land Cover Data Download*. Retrieved June 6, 2019, from U.S. Geological Survey: https://www.usgs.gov/core-science-systems/science-analytics-and-synthesis/gap/science/land-cover-data-download?qt-science_center_objects=0#qt-science_center_objects

U.S. Geological Survey. (2014). *Two-percent probability of exceedance in 50 years map of peak ground acceleration*. Retrieved 2019, from Earthquake Hazards Program: https://earthquake.usgs.gov/static/lfs/nshm/conterminous/2014/2014pga2pct.pdf

U.S. Geological Survey. (2016a). Gap Analysis Program (GAP); Protected Areas Database of the United States (PAD-US). Version 1.4 Combined Feature Class (May 2016). Retrieved from http://gapanalysis.usgs.gov/padus/data/download/

U.S. Geological Survey. (2016b). *Landsat Collections*. Retrieved from https://landsat.usgs.gov/landsat-collections

U.S. Geological Survey. (2018). *Science in Your Watershed (February 15, 2018)*. Retrieved from USGS: https://water.usgs.gov/wsc/cat/10170202.html

U.S. Geological Survey. (2019a). *National Hydrography Dataset*. Retrieved 2019, from National Hydrography: https://www.usgs.gov/core-science-systems/ngp/national-hydrography/national-hydrography-dataset?qt-science_support_page_related_con=0#qt-science_support_page_related_con

U.S. Geological Survey. (2019b). *U.S. Quaternary Faults*. Retrieved 2019, from Interactive Quaternary faults database: https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf

U.S. Geological Survey. (2019c). USGS Public Distribution of FSA 10:1 NAIP Imagery Downloadable Data Collection from The National Map (June 7, 2019). Retrieved from https://catalog.data.gov/dataset/fsa-10-1-naip-imagery-downloadable-data-collection-from-the-national-map

United States Census Bureau. (2019a). *American Fact Finder; Community Facts*. Retrieved May 27, 2019, from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

United States Census Bureau. (2019b). *Quick Facts: Deuel County, South Dakota; United States*. Retrieved May 27, 2019, from https://www.census.gov/quickfacts/fact/table/deuelcountysouthdakota,US/PST045218

Western Ecosystems Technology, Inc. (2018). Minutes from meeting between J. Dingledine, S. Hicks, C. Mensing, and J. Wong (U.S. Fish and Wildlife Service) and C. Fritchman, R. Good, and K. Murray (WEST). Dec. 6, 2018.

World Health Organization. (2007). *Environmental Health Criteria 238, Extremely Low Frequency Fields*. Retrieved May 27, 2019, from http://www.who.int/peh-emf/publications/Complet_DEC_2007.pdf?ua=1

Appendices

Appendix A

Seeding Specifications

730.1 DESCRIPTION

This work consists of preparing a seedbed and furnishing and planting seed on disturbed areas, except roadbeds, within the limits of the work.

730.2 MATERIALS

A. General: The seed shall comply with the requirements of the South Dakota Seed Law.

B. Origin Limitations: Grass seed furnished shall be the grass species listed in the plans. The Contractor may use one of the grass varieties listed in the plans for the specified grass species or the Contractor may use a different grass variety of the same grass species specified. If the Contractor uses a grass variety listed in the plans for the specified grass species, the grass seed origin limitations will not apply. If the Contractor uses a grass variety not listed in the plans for the specified grass species, the grass seed furnished must originate in South Dakota, North Dakota, Montana, Wyoming, Nebraska, Iowa, Minnesota, Kansas, Colorado, or Wisconsin. Grass seed grown outside this area may be approved after the Contractor has furnished written certification from three seed suppliers confirming seed grown within this area is not readily available.

Forb, sedge, rush, shrub, and wildflower seed must originate in the United States or Canada. Forb, sedge, rush, shrub, and wildflower seed grown outside the United States and Canada may be approved after the Contractor has furnished written certification from three seed suppliers confirming seed grown within the two countries is not readily available.

C. Seed Testing: Seed shall be tested within 9 months prior to planting, exclusive of the calendar month in which the test was completed. Testing shall be performed by a State Seed Lab, Commercial Seed Testing Lab, or a registered member of the Society of Commercial Seed Analysts (Registered Seed Technologist). A certified test report shall be furnished prior to the start of seeding operations. If the seed is not planted within the 9 month period, the Contractor shall have the seed retested for germination, as described above, and a current germination report with the certified test report shall be furnished prior to starting seeding operations. The retest will be based on a sample obtained from the seed out of compliance.

D. Labeling: Each bag of seed delivered to the project shall bear a tag which shows the following information:

1. Name and address of supplier.

2. County and project number for which seed is to be used.

3. Suppliers lot number for each kind of seed in the mixture.

4. Origin (where grown) for each kind of seed.

5. Purity, germination, and other information required by South Dakota Seed Law, for each kind of seed.

6. Pounds of bulk seed of each kind of seed in each bag.

7. Total pounds of bulk seed mixture in each bag.

8. Pounds of pure live seed (PLS) of each kind of seed in each bag.

9. Total pounds of PLS mixture in each bag.

10. Dormant seed and hard seed.

When bulk seed is referred to, it is defined as total seed, including PLS, inert matter, crop seed, and weed seed.

E. Inoculation of Legumes: Prior to seeding, legumes (alfalfa, clovers, etc.) shall be inoculated with fresh culture of the appropriate nitrogen fixing bacteria in accordance with instruction accompanying the inoculant. A certification of the inoculation shall be furnished.

730.3 CONSTRUCTION REQUIREMENTS

A. General Requirements: Within seasonal limitations, seeding shall be done as soon as finish grading and placing topsoil on each section have been completed.

Seeding or related work shall not be done when the ground is frozen or the condition of the soil is such that a satisfactory seedbed or uniform seed placement cannot be obtained. Seed shall not be sown, when the wind interferes with uniform seed application, or on areas under water.

Slopes shall be worked longitudinally, on contour, during the preparation of areas, drilling, and after seeding.

Fertilizing and mulching shall be provided as specified in Sections 731 and 732.

The Engineer may approve necessary adjustments in the requirements outlined to obtain the most satisfactory results under varying conditions.

B. Seasonal Limitations: Permanent seeding shall not be done between June 1 and August 1, without written authorization from the Region Engineer.

C. Application Rate: The seed mixture shall be applied at the plan specified rate of pounds of PLS per acre. If a retest of the seed mixture shows a reduction in PLS, adjustment of the seed mixture rate will not be made. Measurement will be reduced as set forth in Section 730.4.

The Contractor will be required to calibrate the drill or hydroseeder on each project. Calibration runs may be performed on areas to be seeded.

D. Cover Crop Seeding: When specified in the plans or directed by the Engineer, cover crop shall be seeded. Exception to the cover crop seeding may include areas where curb and gutter will be placed and areas as determined by the Engineer.

Cover crop seed shall consist of 56 pounds of oats, spring wheat, or winter wheat (minimum 75% PLS) per acre.

Cover crop seeding may be done at any time when the soil and weather conditions are suitable, as determined by the Engineer. Oats or spring wheat shall be used April through July and winter wheat shall be used August through November.

E. Equipment and Methods:

1. **Seedbed Preparation:** The Contractor shall work areas to be seeded to a depth of approximately 3 inches. The Contractor shall take every effort to obtain this depth on the first pass with tillage equipment. The Contractor shall remove and dispose of logs, stumps, brush, weeds, cobbles, and other foreign material which interferes with the proper operation of drills and other implements. After the initial seedbed preparation, the Contractor shall prepare seedbeds according to the type of grass seed mixture to be planted.

   a. **Turf Grass Seed Mixtures:** The Contractor shall remove rocks larger than 3/4 inch. The Contractor shall construct the surface to be seeded to the required cross section. The Contractor shall shape the surface to remove mounds and low spots to provide a smooth even surface to match grade and cross section as shown in the plans. After seeding and fertilizing, the seedbed shall be rolled or otherwise worked by a method approved by the Engineer to firm the seedbed and break up lumps and clods so they are no larger than 3/4 inch in size.

   b. **All Other Grass Seed Mixtures:** Lumps and clods exposed by the initial pass of tillage equipment over 3 inches in diameter shall be broken up. The implement used shall be a tool carrier with rigid shanks with sweeps or chisels, or a heavy duty disk as appropriate to the conditions. The implement shall have positive means of controlling depth of penetration. The number of passes required to break up lumps and clods shall be kept to a minimum. Working the soil to a fine pulverized condition shall be avoided. The final prepared seedbed shall be left in a roughened condition consisting mainly of lumps 2 to 3 inches in diameter, for maximum resistance to erosion. After seedbed preparation has been completed, the Contractor shall pick up and dispose of all loose stones and boulders having a vertical projection of 3 inches or more above the soil surface.

2. **Reseeding of Previously Seeded Areas:** Existing vegetation and cover crop shall be preserved for mulch. The seed shall be drilled directly into existing cover if possible, or by mowing and disking to permit penetration of drill openers and placement of seed to the specified depth.

3. **Drilling:** The specified seed mixture shall be uniformly drilled using a press drill equipped with individually mounted, adjustable, spring loaded, double disk furrow openers fitted with depth control bands or drums.

   The depth control bands or drums shall be of a size to provide a final planting depth of 1/4 to 1/2 inch behind the press wheel.

   The press drill shall be mounted on rear press wheels, which carry a major portion of the weight of the drill, and shall have no weight carrying wheels at the ends of the seedbox. The press wheels shall be mounted independently of the furrow openers. A press wheel shall follow directly behind each opener to compact the soil over the drill row.

   Seeding may be done with drills other than press drills provided they are equipped with baffles, partitions, agitators, or augers which keep the seed distributed throughout the seed box. They must also have packer wheels which follow directly behind double disk furrow openers and provide compaction of the seeded drill rows similar to the compaction obtained by a press drill. No-till drills will be allowed for seeding into cover crop or existing vegetation as long as the seed is planted to the required depth.

   The seedbox shall be equipped with positive feed mechanisms which will accurately meter the seed, and agitators which will prevent bridging in the seedbox and keep the seed uniformly mixed during drilling. The drill shall conform to the following:

   Drill Width Maximums:

   a. Single units.....10 feet
   b. Flex coupled side by side units .....16 feet
   (maximum two 8 foot members)
   c. Max. drill row (openers) spacing .....8 inches

   Each drill shall be equipped with a metering device which will measure the area covered by the drill.

   Each drill shall be equipped with fabricated baffles or partitions mounted a maximum of 2 foot on centers and flush with the top of the seedbox and extending downward to within 4 inches of the bottom of the seedbox.

   On areas where a press drill cannot be operated satisfactorily, hydraulic, cyclone or knapsack hand operated, or other broadcast type seeders may be used.

   The Contractor shall rake or drag (incorporate) all seed broadcast within the top 1/4 to 1/2 inch of topsoil. The Engineer may waive this requirement when raking or dragging is deemed, in the Engineer’s sole discretion, not feasible by conventional methods.

4. **Hydroseeding:** The equipment shall be designed specifically for hydroseeding. The nozzle shall be adaptable to hydraulic seeding requirements. Storage tanks shall have a means of estimating the volume used or remaining in the tank.

F. Care during Construction and Final Inspection: Dirt ridges which result from seeding operations or from traffic shall be smoothed so they will not interfere with future mowing operations.

Following completion of seeding operations, foot, vehicular, or equipment traffic over the seeded area shall be avoided. Areas damaged from such traffic shall be reworked and reseeded.

Before the Acceptance of Field Work is made by the Area Office, any area on which the original seed has been lost or displaced shall be reseeded.

G. Excluded Areas: Certain areas outside the right-of-way widths which are devoted to cultivation, and undisturbed areas within the right-of-way widths which have a good growth of grass may be excluded from seeding operations.

730.4 METHOD OF MEASUREMENT

Permanent seed will be measured to the nearest pound of PLS furnished and planted. Unauthorized increases in the specified rate of seeding will not be measured for payment. Seed required for calibration of the drill will be measured. Reseeding of areas damaged from causes beyond the control of the Contractor will be measured and added to the original quantities used.

The weight of PLS is computed by multiplying the purity, times the sum of the germination and dormant seed value, times the weight of bulk seed applied. The purity, dormant seed, and germination values will be as shown on the bag tag. If the seed has been retested based on Section 730.2 C, the retested value will be used in determining PLS.

Cover crop seeding shall be measured per bushel. For purposes of measurement, one bushel of cover crop seed shall be considered to be 56 pounds of bulk seed regardless of whether oats, spring wheat, or winter wheat is used.

730.5 BASIS OF PAYMENT

Pure live seed will be paid for at the contract unit price per pound of permanent seed. Payment will be full compensation for the preparation of the seedbed, labor, tools, equipment, inoculant and its application, and incidentals necessary.

Cover crop seeding shall be paid for at the contract unit price per bushel. Payment will be full compensation for the preparation of the seedbed, labor, tools, equipment, inoculant and its application, and incidentals necessary.

731.1 DESCRIPTION

This work consists of furnishing and applying fertilizer material on areas to be seeded or sodded.

731.2 MATERIALS

A. Requirements: Fertilizer shall be a dry standard commercial product conforming to the South Dakota Fertilizer Law and subsequent amendments or revisions. Each brand and grade of fertilizer must be registered with the State Department of Agriculture. Each bag or container shall clearly show the net weight of the contents, the name and address of the manufacturer, the brand and grade, the guaranteed analysis of the contents showing the minimum percentages of total nitrogen, phosphoric acid, and water soluble potash available, in that order.

B. Condition: Fertilizer shall be in a condition which permits proper distribution.

C. Testing: Testing of fertilizer will not be required. Before fertilizer is approved for use, the Contractor shall submit a certified statement from the manufacturer stating that the fertilizer is registered for sale in South Dakota and complies with the South Dakota Fertilizer Law. The certified statement shall include the name of the Contractor, the project number, the county, and all information that appears on the containers, as listed in Section 731.2 A.

731.3 CONSTRUCTION REQUIREMENTS

A. Application: Fertilizer shall be applied not more than 48 hours prior to seeding. Fertilizer shall be applied by one of the following methods:

1. With a fertilizer attachment on the drill, which will place the fertilizer in a band on or near the drill row behind the openers during the drilling operations (preferred method).

2. By drilling in with an approved drill prior to seeding.

3. By spreading the fertilizer uniformly over the areas to be seeded prior to or during seedbed preparation (before final pass). This method will not be acceptable when seedbed preparation is not required.

4. Where the seed is sown by a hydraulic seeder, the required amount of fertilizer may be placed in the tank, mixed together with the water and the seed, and applied in the seeding operation.

5. By hand operated broadcaster following sod installation.

6. By equipment mounted broadcast spreaders on slopes flatter than 6:1.

B. Cleanup: The Contractor shall sweep all fertilizer misplaced on adjacent pavement onto the seedbed. The Contractor shall remove and dispose of all logs, stumps, brush and other foreign material exposed during fertilizer application including rocks larger than 3/4 inch in areas to be seeded with turf grass mixtures and rocks and clods having a vertical projection of 3 inches or more above the soil surface in all other areas.

C. Refertilizing: Before the Acceptance of Field Work is made by the Area Office, any area on which the original fertilizer has been lost or displaced shall be refertilized.

731.4 METHOD OF MEASUREMENT

Fertilizing will be measured to the nearest 0.01 ton or as specified in the plans.

Refertilizing of areas damaged by causes beyond the control of the Contractor will be measured and added to the original quantity used.

731.5 BASIS OF PAYMENT

Fertilizing will be paid for at the contract unit price per ton or as specified in the plans. Payment will be full compensation for furnishing, hauling, placing, labor, equipment, materials, tools, and incidentals necessary.

732.1 DESCRIPTION

This work consists of placing a mulch cover on slopes or other designated areas following seeding and fertilizing operations.

732.2 MATERIALS

A. Grass Hay or Straw Mulch: Grass hay or straw mulching material shall be free of noxious weed seeds and objectionable foreign matter. The mulch shall have been baled dry, in bales of approximately equal weight and shall be relatively dry when applied. Materials with noxious weed contamination or materials with characteristics unsuitable for the purpose intended will be rejected and the Contractor shall remove the contaminated material from the project.

Bromegrass is not an acceptable mulch.

B. Fiber Mulch: Fiber mulch shall contain no germination or growth inhibiting factors and shall have the property of becoming evenly dispersed and suspended when agitated in water. Fiber mulch that is blended with recycled paper is not allowed. When sprayed uniformly with hydraulic seeding equipment on the surface of the soil, the fibers shall form a blotter like ground cover, which will readily absorb water and allow infiltration to the underlying soil without restricting emergence of seedlings. Weight specification from suppliers, and for all applications, shall refer only to air dry weight of the fiber, considered to be 10% moisture.

The fiber mulch material shall be supplied in packages marked by the manufacturer to show the air dry weight content. Suppliers shall certify that laboratory and field testing of their product has been accomplished, and that it meets all of the foregoing requirements.

C. Bonded Fiber Matrix: Bonded fiber matrix shall consist of a continuous layer of elongated fiber strands held together by a water resistant bonding agent. The bonded fiber matrix shall be uniformly applied and shall have no gaps between the product and the seeded soil. The product shall be 100% biodegradable and composed of 90% wood fiber, 9% natural binder, and 1% organic and mineral activators (all by weight). The treatment shall be installed with hydraulic seeding equipment.

D. Fiber Reinforced Matrix: Fiber reinforced matrix shall consist of thermally processed fiber, crimped interlocking fibers, cross-linked hydrocolloidal polymer tackifiers, and activators. Fiber reinforced matrix shall form an intimate bond with the soil surface. The fiber reinforced matrix shall form a continuous, flexible, and lofty interlocking matrix that creates air spaces and water absorbing cavities to improve seed germination, reduce the impact of raindrop energy, and minimize soil loss. The treatment shall be installed with hydraulic seeding equipment.

732.3 CONSTRUCTION REQUIREMENTS

During mulching operations, suitable warning signs shall be provided in accordance with Section 7.10.

A. Grass Hay or Straw Mulch:

1. **Placing:** The mulch shall be placed within 48 hours after the seeding has been completed. Mulching operations shall not be performed during periods of high winds, which preclude the proper placing of the mulch. The placing of mulch shall begin on the windward side of the areas to be covered.

   The mulch shall be machine blown to uniformly distribute mulch over the seeded areas. The machine shall blow or eject mulch, by a constant air stream, that controls the amount of mulch. The machine shall cause a minimum of cutting or breakage of the mulch.

   Mulch containing excessive moisture, which prevents uniform feeding through the machine, shall not be used.

   Mulch shall be placed uniformly over the seeded areas at a rate of 2 tons per acre. Approximately 10% of the soil surface shall be visible through the mulch blanket prior to mulch tiller (punching) operation.

   Excessive cover, which will smother seedlings, shall be avoided. The Engineer may order the placement of mulch on any area where protection is necessary to forestall erosion or encourage turf establishment.

2. **Punching:** Immediately following application, the mulch, shall be punched into the soil by a mulch tiller consisting of a series of dull, flat disks with notched or cutout edges. The disks shall be approximately 20 inches in diameter, 1/4 inch thick, spaced approximately 8 inches apart and fitted with scrapers.

   Working width of the tiller shall not exceed 6 feet per member, but may be operated in gangs of not over three members. The tiller shall be operated on contour, except those on slopes 3:1 or steeper diagonal operation will be permitted.

   Tiller members shall be ballasted; to push mulch into the soil approximately 3 inches with ends exposed above the soil surface.

   The mulch tiller shall follow as closely as possible behind the mulcher. Mulch shall not be blown when wind velocity causes appreciable displacement before it can be anchored by the mulch tiller. More than one pass of the mulch tiller may be required to ensure adequate anchoring.

B. Fiber Mulch: Rate of application shall be 2,000 pounds per acre unless otherwise specified in the plans or by the Engineer. Excessive thickness of mulch, which will smother grass seedlings, shall be avoided.

Mulch shall be placed on a given area as soon as possible or within 48 hours after seeding as a separate operation. The Contractor shall allow the fiber mulch to cure a minimum of 18 hours prior to watering.

C. Bonded Fiber Matrix: Rate of application shall be 3900 pounds per acre and the mix shall consist of 50 pounds bonded fiber matrix to 125 gallons water unless otherwise specified in the plans or by the Engineer. Bonded fiber matrix shall be placed on a given area as soon as possible, or within 48 hours after seeding as a separate operation.

D. Fiber Reinforced Matrix: Fiber reinforced matrix shall not be placed in channels. Fiber reinforced matrix shall be placed on a given area as soon as possible and within 48 hours after seeding as a separate operation. Fiber reinforced matrix is effective upon application therefore does not require a curing time.

E. Care during Construction until Acceptance of Field Work: Traffic, either foot, equipment, or vehicle shall be avoided over the seeded and mulched areas.

Before the Acceptance of Field Work is made by the Area Office, any area on which the original mulch has been displaced shall be remulched.

732.4 METHOD OF MEASUREMENT

A. Grass Hay or Straw Mulch: Grass hay or straw mulching material will be measured to the nearest 0.1 ton of mulch applied. Reapplication in areas damaged from causes beyond the control of the Contractor will be measured and added to the original quantities used.

B. Fiber Mulch: Fiber mulch shall be measured to the nearest pound or ton, as specified in the plans, of mulch applied. Reapplication in areas damaged from causes beyond the control of the Contractor will be measured and added to the original quantities used.

C. Bonded Fiber Matrix: Bonded fiber matrix shall be measured to the nearest pound or ton, as specified in the plans, of matrix applied. Reapplication in areas damaged by means beyond the control of the Contractor will be measured and added to the original quantities used.

D. Fiber Reinforced Matrix: Fiber reinforced matrix shall be measured to the nearest pound or ton, as specified in the plans of matrix applied. Reapplication in areas damaged by means beyond the control of the Contractor will be measured and added to the original quantities used.

732.5 BASIS OF PAYMENT

A. Grass Hay or Straw Mulch: Grass hay or straw mulch will be paid for at the contract unit price per ton. Payment will be full compensation for furnishing, hauling, placing, punching, and for materials, equipment, labor, tools, and incidentals necessary.

B. Fiber Mulch: Fiber mulch will be paid for at the contract unit price per pound or ton, as specified in the plans. Payment will be full compensation for furnishing, hauling, and placing and for materials, equipment, labor, tools, and incidentals necessary.

C. Bonded Fiber Matrix: Bonded fiber matrix will be paid for at the contract unit price per pound or ton, as specified in the plans. Payment will be full compensation for furnishing, hauling, and placing and for materials, equipment, labor, tools, and incidentals necessary.

D. Fiber Reinforced Matrix: Fiber reinforced matrix will be paid for at the contract unit price per pound or ton as specified in the plans. Payment will be full compensation for furnishing, hauling, and placing and for materials, equipment, labor, tools, and incidentals necessary.

730.1 DESCRIPTION

This work consists of preparing a seedbed and furnishing and planting seed on disturbed areas, except roadbeds, within the limits of the work.

730.2 MATERIALS

A. General: The seed shall comply with the requirements of the South Dakota Seed Law.

B. Origin Limitations: Grass seed furnished shall be the grass species listed in the plans. The Contractor may use one of the grass varieties listed in the plans for the specified grass species or the Contractor may use a different grass variety of the same grass species specified. If the Contractor uses a grass variety listed in the plans for the specified grass species, the grass seed origin limitations will not apply. If the Contractor uses a grass variety not listed in the plans for the specified grass species, the grass seed furnished must originate in South Dakota, North Dakota, Montana, Wyoming, Nebraska, Iowa, Minnesota, Kansas, Colorado, or Wisconsin. Grass seed grown outside this area may be approved after the Contractor has furnished written certification from three seed suppliers confirming seed grown within this area is not readily available.

Forb, sedge, rush, shrub, and wildflower seed must originate in the United States or Canada. Forb, sedge, rush, shrub, and wildflower seed grown outside the United States and Canada may be approved after the Contractor has furnished written certification from three seed suppliers confirming seed grown within the two countries is not readily available.

C. Seed Testing: Seed shall be tested within 9 months prior to planting, exclusive of the calendar month in which the test was completed. Testing shall be performed by a State Seed Lab, Commercial Seed Testing Lab, or a registered member of the Society of Commercial Seed Analysts (Registered Seed Technologist). A certified test report shall be furnished prior to the start of seeding operations. If the seed is not planted within the 9 month period, the Contractor shall have the seed retested for germination, as described above, and a current germination report with the certified test report shall be furnished prior to starting seeding operations. The retest will be based on a sample obtained from the seed out of compliance.

D. Labeling: Each bag of seed delivered to the project shall bear a tag which shows the following information:

1. Name and address of supplier.

2. County and project number for which seed is to be used.

3. Suppliers lot number for each kind of seed in the mixture.

4. Origin (where grown) for each kind of seed.

5. Purity, germination, and other information required by South Dakota Seed Law, for each kind of seed.

6. Pounds of bulk seed of each kind of seed in each bag.

7. Total pounds of bulk seed mixture in each bag.

8. Pounds of pure live seed (PLS) of each kind of seed in each bag.

9. Total pounds of PLS mixture in each bag.

10. Dormant seed and hard seed.

When bulk seed is referred to, it is defined as total seed, including PLS, inert matter, crop seed, and weed seed.

E. Inoculation of Legumes: Prior to seeding, legumes (alfalfa, clovers, etc.) shall be inoculated with fresh culture of the appropriate nitrogen fixing bacteria in accordance with instruction accompanying the inoculant. A certification of the inoculation shall be furnished.

730.3 CONSTRUCTION REQUIREMENTS

A. General Requirements: Within seasonal limitations, seeding shall be done as soon as finish grading and placing topsoil on each section have been completed.

Seeding or related work shall not be done when the ground is frozen or the condition of the soil is such that a satisfactory seedbed or uniform seed placement cannot be obtained. Seed shall not be sown, when the wind interferes with uniform seed application, or on areas under water.

Slopes shall be worked longitudinally, on contour, during the preparation of areas, drilling, and after seeding.

Fertilizing and mulching shall be provided as specified in Sections 731 and 732.

The Engineer may approve necessary adjustments in the requirements outlined to obtain the most satisfactory results under varying conditions.

B. Seasonal Limitations: Permanent seeding shall not be done between June 1 and August 1, without written authorization from the Region Engineer.

C. Application Rate: The seed mixture shall be applied at the plan specified rate of pounds of PLS per acre. If a retest of the seed mixture shows a reduction in PLS, adjustment of the seed mixture rate will not be made. Measurement will be reduced as set forth in Section 730.4.

The Contractor will be required to calibrate the drill or hydroseeder on each project. Calibration runs may be performed on areas to be seeded.

D. Cover Crop Seeding: When specified in the plans or directed by the Engineer, cover crop shall be seeded. Exception to the cover crop seeding may include areas where curb and gutter will be placed and areas as determined by the Engineer.

Cover crop seed shall consist of 56 pounds of oats, spring wheat, or winter wheat (minimum 75% PLS) per acre.

Cover crop seeding may be done at any time when the soil and weather conditions are suitable, as determined by the Engineer. Oats or spring wheat shall be used April through July and winter wheat shall be used August through November.

E. Equipment and Methods:

1. **Seedbed Preparation:** The Contractor shall work areas to be seeded to a depth of approximately 3 inches. The Contractor shall take every effort to obtain this depth on the first pass with tillage equipment. The Contractor shall remove and dispose of logs, stumps, brush, weeds, cobbles, and other foreign material which interferes with the proper operation of drills and other implements. After the initial seedbed preparation, the Contractor shall prepare seedbeds according to the type of grass seed mixture to be planted.

   a. **Turf Grass Seed Mixtures:** The Contractor shall remove rocks larger than 3/4 inch. The Contractor shall construct the surface to be seeded to the required cross section. The Contractor shall shape the surface to remove mounds and low spots to provide a smooth even surface to match grade and cross section as shown in the plans. After seeding and fertilizing, the seedbed shall be rolled or otherwise worked by a method approved by the Engineer to firm the seedbed and break up lumps and clods so they are no larger than 3/4 inch in size.

   b. **All Other Grass Seed Mixtures:** Lumps and clods exposed by the initial pass of tillage equipment over 3 inches in diameter shall be broken up. The implement used shall be a tool carrier with rigid shanks with sweeps or chisels, or a heavy duty disk as appropriate to the conditions. The implement shall have positive means of controlling depth of penetration. The number of passes required to break up lumps and clods shall be kept to a minimum. Working the soil to a fine pulverized condition shall be avoided. The final prepared seedbed shall be left in a roughened condition consisting mainly of lumps 2 to 3 inches in diameter, for maximum resistance to erosion. After seedbed preparation has been completed, the Contractor shall pick up and dispose of all loose stones and boulders having a vertical projection of 3 inches or more above the soil surface.

2. **Reseeding of Previously Seeded Areas:** Existing vegetation and cover crop shall be preserved for mulch. The seed shall be drilled directly into existing cover if possible, or by mowing and disking to permit penetration of drill openers and placement of seed to the specified depth.

3. **Drilling:** The specified seed mixture shall be uniformly drilled using a press drill equipped with individually mounted, adjustable, spring loaded, double disk furrow openers fitted with depth control bands or drums.

   The depth control bands or drums shall be of a size to provide a final planting depth of 1/4 to 1/2 inch behind the press wheel.

   The press drill shall be mounted on rear press wheels, which carry a major portion of the weight of the drill, and shall have no weight carrying wheels at the ends of the seedbox. The press wheels shall be mounted independently of the furrow openers. A press wheel shall follow directly behind each opener to compact the soil over the drill row.

   Seeding may be done with drills other than press drills provided they are equipped with baffles, partitions, agitators, or augers which keep the seed distributed throughout the seed box. They must also have packer wheels which follow directly behind double disk furrow openers and provide compaction of the seeded drill rows similar to the compaction obtained by a press drill. No-till drills will be allowed for seeding into cover crop or existing vegetation as long as the seed is planted to the required depth.

   The seedbox shall be equipped with positive feed mechanisms which will accurately meter the seed, and agitators which will prevent bridging in the seedbox and keep the seed uniformly mixed during drilling. The drill shall conform to the following:

   Drill Width Maximums:

   a. Single units.....10 feet
   b. Flex coupled side by side units .....16 feet
   (maximum two 8 foot members)
   c. Max. drill row (openers) spacing .....8 inches

   Each drill shall be equipped with a metering device which will measure the area covered by the drill.

   Each drill shall be equipped with fabricated baffles or partitions mounted a maximum of 2 foot on centers and flush with the top of the seedbox and extending downward to within 4 inches of the bottom of the seedbox.

   On areas where a press drill cannot be operated satisfactorily, hydraulic, cyclone or knapsack hand operated, or other broadcast type seeders may be used.

   The Contractor shall rake or drag (incorporate) all seed broadcast within the top 1/4 to 1/2 inch of topsoil. The Engineer may waive this requirement when raking or dragging is deemed, in the Engineer’s sole discretion, not feasible by conventional methods.

4. **Hydroseeding:** The equipment shall be designed specifically for hydroseeding. The nozzle shall be adaptable to hydraulic seeding requirements. Storage tanks shall have a means of estimating the volume used or remaining in the tank.

F. Care during Construction and Final Inspection: Dirt ridges which result from seeding operations or from traffic shall be smoothed so they will not interfere with future mowing operations.

Following completion of seeding operations, foot, vehicular, or equipment traffic over the seeded area shall be avoided. Areas damaged from such traffic shall be reworked and reseeded.

Before the Acceptance of Field Work is made by the Area Office, any area on which the original seed has been lost or displaced shall be reseeded.

G. Excluded Areas: Certain areas outside the right-of-way widths which are devoted to cultivation, and undisturbed areas within the right-of-way widths which have a good growth of grass may be excluded from seeding operations.

730.4 METHOD OF MEASUREMENT

Permanent seed will be measured to the nearest pound of PLS furnished and planted. Unauthorized increases in the specified rate of seeding will not be measured for payment. Seed required for calibration of the drill will be measured. Reseeding of areas damaged from causes beyond the control of the Contractor will be measured and added to the original quantities used.

The weight of PLS is computed by multiplying the purity, times the sum of the germination and dormant seed value, times the weight of bulk seed applied. The purity, dormant seed, and germination values will be as shown on the bag tag. If the seed has been retested based on Section 730.2 C, the retested value will be used in determining PLS.

Cover crop seeding shall be measured per bushel. For purposes of measurement, one bushel of cover crop seed shall be considered to be 56 pounds of bulk seed regardless of whether oats, spring wheat, or winter wheat is used.

730.5 BASIS OF PAYMENT

Pure live seed will be paid for at the contract unit price per pound of permanent seed. Payment will be full compensation for the preparation of the seedbed, labor, tools, equipment, inoculant and its application, and incidentals necessary.

Cover crop seeding shall be paid for at the contract unit price per bushel. Payment will be full compensation for the preparation of the seedbed, labor, tools, equipment, inoculant and its application, and incidentals necessary.

731.1 DESCRIPTION

This work consists of furnishing and applying fertilizer material on areas to be seeded or sodded.

731.2 MATERIALS

A. Requirements: Fertilizer shall be a dry standard commercial product conforming to the South Dakota Fertilizer Law and subsequent amendments or revisions. Each brand and grade of fertilizer must be registered with the State Department of Agriculture. Each bag or container shall clearly show the net weight of the contents, the name and address of the manufacturer, the brand and grade, the guaranteed analysis of the contents showing the minimum percentages of total nitrogen, phosphoric acid, and water soluble potash available, in that order.

B. Condition: Fertilizer shall be in a condition which permits proper distribution.

C. Testing: Testing of fertilizer will not be required. Before fertilizer is approved for use, the Contractor shall submit a certified statement from the manufacturer stating that the fertilizer is registered for sale in South Dakota and complies with the South Dakota Fertilizer Law. The certified statement shall include the name of the Contractor, the project number, the county, and all information that appears on the containers, as listed in Section 731.2 A.

731.3 CONSTRUCTION REQUIREMENTS

A. Application: Fertilizer shall be applied not more than 48 hours prior to seeding. Fertilizer shall be applied by one of the following methods:

1. With a fertilizer attachment on the drill, which will place the fertilizer in a band on or near the drill row behind the openers during the drilling operations (preferred method).

2. By drilling in with an approved drill prior to seeding.

3. By spreading the fertilizer uniformly over the areas to be seeded prior to or during seedbed preparation (before final pass). This method will not be acceptable when seedbed preparation is not required.

4. Where the seed is sown by a hydraulic seeder, the required amount of fertilizer may be placed in the tank, mixed together with the water and the seed, and applied in the seeding operation.

5. By hand operated broadcaster following sod installation.

6. By equipment mounted broadcast spreaders on slopes flatter than 6:1.

B. Cleanup: The Contractor shall sweep all fertilizer misplaced on adjacent pavement onto the seedbed. The Contractor shall remove and dispose of all logs, stumps, brush and other foreign material exposed during fertilizer application including rocks larger than 3/4 inch in areas to be seeded with turf grass mixtures and rocks and clods having a vertical projection of 3 inches or more above the soil surface in all other areas.

C. Refertilizing: Before the Acceptance of Field Work is made by the Area Office, any area on which the original fertilizer has been lost or displaced shall be refertilized.

731.4 METHOD OF MEASUREMENT

Fertilizing will be measured to the nearest 0.01 ton or as specified in the plans.

Refertilizing of areas damaged by causes beyond the control of the Contractor will be measured and added to the original quantity used.

731.5 BASIS OF PAYMENT

Fertilizing will be paid for at the contract unit price per ton or as specified in the plans. Payment will be full compensation for furnishing, hauling, placing, labor, equipment, materials, tools, and incidentals necessary.

732.1 DESCRIPTION

This work consists of placing a mulch cover on slopes or other designated areas following seeding and fertilizing operations.

732.2 MATERIALS

A. Grass Hay or Straw Mulch: Grass hay or straw mulching material shall be free of noxious weed seeds and objectionable foreign matter. The mulch shall have been baled dry, in bales of approximately equal weight and shall be relatively dry when applied. Materials with noxious weed contamination or materials with characteristics unsuitable for the purpose intended will be rejected and the Contractor shall remove the contaminated material from the project.

Bromegrass is not an acceptable mulch.

B. Fiber Mulch: Fiber mulch shall contain no germination or growth inhibiting factors and shall have the property of becoming evenly dispersed and suspended when agitated in water. Fiber mulch that is blended with recycled paper is not allowed. When sprayed uniformly with hydraulic seeding equipment on the surface of the soil, the fibers shall form a blotter like ground cover, which will readily absorb water and allow infiltration to the underlying soil without restricting emergence of seedlings. Weight specification from suppliers, and for all applications, shall refer only to air dry weight of the fiber, considered to be 10% moisture.

The fiber mulch material shall be supplied in packages marked by the manufacturer to show the air dry weight content. Suppliers shall certify that laboratory and field testing of their product has been accomplished, and that it meets all of the foregoing requirements.

C. Bonded Fiber Matrix: Bonded fiber matrix shall consist of a continuous layer of elongated fiber strands held together by a water resistant bonding agent. The bonded fiber matrix shall be uniformly applied and shall have no gaps between the product and the seeded soil. The product shall be 100% biodegradable and composed of 90% wood fiber, 9% natural binder, and 1% organic and mineral activators (all by weight). The treatment shall be installed with hydraulic seeding equipment.

D. Fiber Reinforced Matrix: Fiber reinforced matrix shall consist of thermally processed fiber, crimped interlocking fibers, cross-linked hydrocolloidal polymer tackifiers, and activators. Fiber reinforced matrix shall form an intimate bond with the soil surface. The fiber reinforced matrix shall form a continuous, flexible, and lofty interlocking matrix that creates air spaces and water absorbing cavities to improve seed germination, reduce the impact of raindrop energy, and minimize soil loss. The treatment shall be installed with hydraulic seeding equipment.

732.3 CONSTRUCTION REQUIREMENTS

During mulching operations, suitable warning signs shall be provided in accordance with Section 7.10.

A. Grass Hay or Straw Mulch:

1. **Placing:** The mulch shall be placed within 48 hours after the seeding has been completed. Mulching operations shall not be performed during periods of high winds, which preclude the proper placing of the mulch. The placing of mulch shall begin on the windward side of the areas to be covered.

   The mulch shall be machine blown to uniformly distribute mulch over the seeded areas. The machine shall blow or eject mulch, by a constant air stream, that controls the amount of mulch. The machine shall cause a minimum of cutting or breakage of the mulch.

   Mulch containing excessive moisture, which prevents uniform feeding through the machine, shall not be used.

   Mulch shall be placed uniformly over the seeded areas at a rate of 2 tons per acre. Approximately 10% of the soil surface shall be visible through the mulch blanket prior to mulch tiller (punching) operation.

   Excessive cover, which will smother seedlings, shall be avoided. The Engineer may order the placement of mulch on any area where protection is necessary to forestall erosion or encourage turf establishment.

2. **Punching:** Immediately following application, the mulch, shall be punched into the soil by a mulch tiller consisting of a series of dull, flat disks with notched or cutout edges. The disks shall be approximately 20 inches in diameter, 1/4 inch thick, spaced approximately 8 inches apart and fitted with scrapers.

   Working width of the tiller shall not exceed 6 feet per member, but may be operated in gangs of not over three members. The tiller shall be operated on contour, except those on slopes 3:1 or steeper diagonal operation will be permitted.

   Tiller members shall be ballasted; to push mulch into the soil approximately 3 inches with ends exposed above the soil surface.

   The mulch tiller shall follow as closely as possible behind the mulcher. Mulch shall not be blown when wind velocity causes appreciable displacement before it can be anchored by the mulch tiller. More than one pass of the mulch tiller may be required to ensure adequate anchoring.

B. Fiber Mulch: Rate of application shall be 2,000 pounds per acre unless otherwise specified in the plans or by the Engineer. Excessive thickness of mulch, which will smother grass seedlings, shall be avoided.

Mulch shall be placed on a given area as soon as possible or within 48 hours after seeding as a separate operation. The Contractor shall allow the fiber mulch to cure a minimum of 18 hours prior to watering.

C. Bonded Fiber Matrix: Rate of application shall be 3900 pounds per acre and the mix shall consist of 50 pounds bonded fiber matrix to 125 gallons water unless otherwise specified in the plans or by the Engineer. Bonded fiber matrix shall be placed on a given area as soon as possible, or within 48 hours after seeding as a separate operation.

D. Fiber Reinforced Matrix: Fiber reinforced matrix shall not be placed in channels. Fiber reinforced matrix shall be placed on a given area as soon as possible and within 48 hours after seeding as a separate operation. Fiber reinforced matrix is effective upon application therefore does not require a curing time.

E. Care during Construction until Acceptance of Field Work: Traffic, either foot, equipment, or vehicle shall be avoided over the seeded and mulched areas.

Before the Acceptance of Field Work is made by the Area Office, any area on which the original mulch has been displaced shall be remulched.

732.4 METHOD OF MEASUREMENT

A. Grass Hay or Straw Mulch: Grass hay or straw mulching material will be measured to the nearest 0.1 ton of mulch applied. Reapplication in areas damaged from causes beyond the control of the Contractor will be measured and added to the original quantities used.

B. Fiber Mulch: Fiber mulch shall be measured to the nearest pound or ton, as specified in the plans, of mulch applied. Reapplication in areas damaged from causes beyond the control of the Contractor will be measured and added to the original quantities used.

C. Bonded Fiber Matrix: Bonded fiber matrix shall be measured to the nearest pound or ton, as specified in the plans, of matrix applied. Reapplication in areas damaged by means beyond the control of the Contractor will be measured and added to the original quantities used.

D. Fiber Reinforced Matrix: Fiber reinforced matrix shall be measured to the nearest pound or ton, as specified in the plans of matrix applied. Reapplication in areas damaged by means beyond the control of the Contractor will be measured and added to the original quantities used.

732.5 BASIS OF PAYMENT

A. Grass Hay or Straw Mulch: Grass hay or straw mulch will be paid for at the contract unit price per ton. Payment will be full compensation for furnishing, hauling, placing, punching, and for materials, equipment, labor, tools, and incidentals necessary.

B. Fiber Mulch: Fiber mulch will be paid for at the contract unit price per pound or ton, as specified in the plans. Payment will be full compensation for furnishing, hauling, and placing and for materials, equipment, labor, tools, and incidentals necessary.

C. Bonded Fiber Matrix: Bonded fiber matrix will be paid for at the contract unit price per pound or ton, as specified in the plans. Payment will be full compensation for furnishing, hauling, and placing and for materials, equipment, labor, tools, and incidentals necessary.

D. Fiber Reinforced Matrix: Fiber reinforced matrix will be paid for at the contract unit price per pound or ton as specified in the plans. Payment will be full compensation for furnishing, hauling, and placing and for materials, equipment, labor, tools, and incidentals necessary.

Appendix B

Aquatic Resources Desktop Assessment

SWCA
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

116 North 4th Street, Suite 200
Bismarck, North Dakota 58501
Tel 701.258.6622 Fax 701.258.5957
www.swca.com

TECHNICAL MEMORANDUM

To: **Tatanka Ridge Wind, LLC**
1125 NW Couch Street, Suite 600
Portland, Oregon 97209

From: Jake Powell, Senior Project Manager and Ecologist, SWCA Environmental Consultants

Date: May 17, 2018

Re: **Aquatic Resources Desktop Mapping for the Tatanka Ridge Wind Project**

SWCA Environmental Consultants (SWCA) completed desktop mapping of aquatic resources for the Tatanka Ridge Wind Project (project) in Deuel County, South Dakota. The purpose of the desktop mapping is to identify aquatic resources that could qualify as waters of the U.S. (WOUS) and be subject to U. S. Army Corps of Engineers Section 404 permitting under the Clean Water Act, and, subsequently, to use the results to guide project infrastructure siting. Potential aquatic resources (wetlands or waterbodies with ordinary high water marks) were mapped in a geographic information system (GIS) polygon or line shapefile. The results were submitted to Tatanka Ridge Wind, LLC on May 15, 2018.

The desktop mapping was completed using the Esri ArcMap program. I completed the mapping; in addition to being a senior project manager and ecologist, I am also a wetland biologist experienced with aerial imagery interpretation and wetland resources in eastern South Dakota.

The following spatial layers were used to guide the mapping:

- U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) database
- U.S. Geological Survey National Hydrography Dataset (NHD)
- National Agriculture Imagery Program (NAIP) 2016 digital orthophotography
- NAIP 2016 color infrared imagery
- Natural Resources Conservation Service Soil Survey Geographic Database (SSURGO) soil survey data
- Google Earth historical imagery 1984 through 2016
- Buffalo Ridge III Wind Project wetland delineation layers[1]

If you have any questions or would like additional information, please contact me at 307-673-4303 or jpowell@swca.com.

Sincerely,

Jake Powell, SWCA Senior Project Manager / Ecologist

---

[1] HDR Engineering Inc. 2009. Wetland Report for Buffalo Ridge III Wind Project. Minneapolis, Minnesota. November 2009.

SWCA
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

116 North 4th Street, Suite 200
Bismarck, North Dakota 58501
Tel 701.258.6622 Fax 701.258.5957
www.swca.com

TECHNICAL MEMORANDUM

To: **Tatanka Ridge Wind, LLC**
1125 NW Couch Street, Suite 600
Portland, Oregon 97209

From: Jake Powell, Senior Project Manager and Ecologist, SWCA Environmental Consultants

Date: May 17, 2018

Re: **Aquatic Resources Desktop Mapping for the Tatanka Ridge Wind Project**

SWCA Environmental Consultants (SWCA) completed desktop mapping of aquatic resources for the Tatanka Ridge Wind Project (project) in Deuel County, South Dakota. The purpose of the desktop mapping is to identify aquatic resources that could qualify as waters of the U.S. (WOUS) and be subject to U. S. Army Corps of Engineers Section 404 permitting under the Clean Water Act, and, subsequently, to use the results to guide project infrastructure siting. Potential aquatic resources (wetlands or waterbodies with ordinary high water marks) were mapped in a geographic information system (GIS) polygon or line shapefile. The results were submitted to Tatanka Ridge Wind, LLC on May 15, 2018.

The desktop mapping was completed using the Esri ArcMap program. I completed the mapping; in addition to being a senior project manager and ecologist, I am also a wetland biologist experienced with aerial imagery interpretation and wetland resources in eastern South Dakota.

The following spatial layers were used to guide the mapping:

- U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) database
- U.S. Geological Survey National Hydrography Dataset (NHD)
- National Agriculture Imagery Program (NAIP) 2016 digital orthophotography
- NAIP 2016 color infrared imagery
- Natural Resources Conservation Service Soil Survey Geographic Database (SSURGO) soil survey data
- Google Earth historical imagery 1984 through 2016
- Buffalo Ridge III Wind Project wetland delineation layers[1]

If you have any questions or would like additional information, please contact me at 307-673-4303 or jpowell@swca.com.

Sincerely,

Jake Powell, SWCA Senior Project Manager / Ecologist

---

[1] HDR Engineering Inc. 2009. Wetland Report for Buffalo Ridge III Wind Project. Minneapolis, Minnesota. November 2009.

Appendix C

Wetland Delineation Report

AQUATIC RESOURCES DELINEATION REPORT FOR THE TATANKA RIDGE WIND PROJECT, DEUEL COUNTY, SOUTH DAKOTA

JANUARY 2019

PREPARED FOR

Buffalo Ridge III, LLC

PREPARED BY

SWCA Environmental Consultants

AQUATIC RESOURCES DELINEATION REPORT FOR THE TATANKA RIDGE WIND PROJECT, DEUEL COUNTY, SOUTH DAKOTA

Prepared for

Buffalo Ridge III, LLC
1125 NW Couch Street
Portland, Oregon 97209

Prepared by

SWCA Environmental Consultants
116 North 4th Street
Bismarck, North Dakota 58501
(701) 258-6622
www.swca.com

January 15, 2019

CONTENTS

1 Introduction 1
1.1 Environmental Setting 2
1.2 Regulatory Background 2
2 Methods 3
2.1 Desktop Review 3
2.2 Field Surveys 3
2.2.1 Wetlands 3
2.2.2 Waterbodies 6
3 Results 6
3.1 Wetlands 6
3.1.1 Wetland Vegetation 14
3.1.2 Wetland Soils 14
3.1.3 Wetland Hydrology 14
3.2 Waterbodies 14
4 Literature Cited 15

Appendices

Appendix A. Maps
Appendix B. Datasheets
Appendix C. Additional Documentation

Tables

Table 1. Acreages and Associated Datapoints of Wetlands Delineated in the Study Area 6
Table 2. Additional Datapoint Information 9
Table 3. Delineated Waterbody 14

This page intentionally left blank.

1 INTRODUCTION

Buffalo Ridge III, LLC, contracted SWCA Environmental Consultants (SWCA) to conduct an aquatic resources delineation (delineation) for the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota (see overview map in Appendix A). SWCA identified and delineated aquatic resources within the survey area provided by Buffalo Ridge III, LLC, that could qualify as waters of the U.S. (WUS) and be subject to permitting by the U.S. Army Corps of Engineers (USACE) under Sections 404 and 401 of the Clean Water Act (CWA).

The Project is located approximately 5 miles west of the South Dakota/Minnesota border, and directly north of the town of Toronto, South Dakota. The proposed Project will have a nameplate capacity of up to 99 megawatts, consisting of wind turbines and associated infrastructure such as access roads, electrical collection system, substation, operations and maintenance building, and a permanent meteorological tower.

This report presents the results of the delineation fieldwork SWCA conducted between July 29 and November 1, 2018, to facilitate sighting and permitting for the Project. This report includes the following items.

- Descriptions of the aquatic resources delineated during the field surveys.
- Maps illustrating the extent of aquatic resources potentially requiring Section 404 permitting within the survey area and boundaries of wetlands and non-wetland waterbodies (reservoirs, ponds, and streams) with ordinary high-water marks (OHWMs) (Appendix A).
- USACE datapoint datasheets (Appendix B) and photographs (Appendix C) for the aquatic resources delineated during the survey.
- Geographic information system (GIS) shapefiles of the delineated aquatic resources (Appendix C).

The project survey area included the following proposed infrastructure and buffers:

- 200-foot (ft) buffer around access roads and overhead and underground transmission lines
- 500 ft buffer around turbines;
- 40 acre blocks around staging areas;
- 100 ft buffer around operation and maintenance and laydown areas; and
- Block survey areas, including:
    - Sections 6 and 7, Township (T) 113 North (N), Range (R) 48 West (W)
    - Sections 34 and 25, T114N, R49W
    - Southeast ¼ Section 9, T113N, R49W

1.1 Environmental Setting

The survey area is within the Rolling Till Prairie major land resource area (MLRA) 102A (Natural Resources Conservation Service [NRCS] 2018a). Most of this area is in the Western Lake Section of the Central Lowland Province of the Interior Plains. The center of the Prairie Coteau, in northeastern South Dakota, is in the Dissected Till Plains section of the same province and division. This MLRA is an area of nearly level to rolling topography that has many depressions and ill-defined drainages. "Prairie pothole" lakes and ponds are common.

The average annual precipitation in this area is 19 to 29 inches (485 to 735 millimeters). Half or more of the precipitation falls during the growing season, which is typically 110 to 180 days in April through September. Rainfall typically occurs as high-intensity, convective thunderstorms during the summer. Precipitation in winter occurs mostly as snow. The average annual temperature is 38 to 45 degrees Fahrenheit (4 to 7 degrees Celsius). The freeze-free period averages about 155 days and ranges from 140 to 175 days. In the western part of the MLRA, rainfall is less abundant and is not always adequate for full maturation of crops (NRCS 2006).

The survey area is primarily comprised of cultivated fields and tame pasture (grazing unit dominated by non-native forage species). Tile drains and ditches to reduce water in the cultivated fields occur throughout the survey area. The tile drains and ditches affect hydrology in a number of ways, including ponding water around tile drain inlets (the drain prevents water from ponding long enough to create hydric soils or hydrophytic vegetation) and redirecting water flow to tile drain outlets and ditches (including creating OHWMs along these flow areas).

1.2 Regulatory Background

Pursuant to Sections 404 and 401 of the CWA, the USACE regulates the discharge of dredge and/or fill material into WUS. Section 404 requires that any entity proposing an activity that would discharge such materials into a WUS must obtain a permit from the USACE. Section 401 requires states to review projects and federal permits to ensure they will not violate South Dakota surface water quality standards.

Designation as a WUS applies to the jurisdictional limits of USACE authority under the CWA and typically includes traditional navigable waters, interstate waters, and wetlands; impoundments, tributaries, and wetlands adjacent to those waters; and territorial seas. Most rivers, creeks, streams, arroyos, lakes, special aquatic sites, and their tributaries are typically designated as WUS. Wetlands are the most common special aquatic site and are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987:9). To be classified as a wetland under federal definition, an area must meet the following three criteria under normal circumstances: 1) have a predominance of hydrophytic vegetation, 2) contain soils that are characteristic of frequent saturation (i.e., hydric soils), and 3) have the presence of hydrology showing regular inundation or saturation (USACE 1987). The OHWM is a defining element for identifying the lateral limits of waterbodies lacking adjacent wetlands and typically represents the outer limits of potential USACE jurisdiction.

SWCA conducted the delineations to assist the USACE determining jurisdiction and to support Section 404 and 401 permitting. The USACE has final and legal authority in determining the presence of jurisdictional WUS and the extent of their boundaries. The South Dakota Department of Environment & Natural Resources has the responsibility of reviewing and approving Section 401 Water Quality Certification for activities occurring outside of Indian Country within South Dakota.

2 METHODS

SWCA identified and delineated aquatic resources within the survey area (as described in Section 1 and shown on the overview map in Appendix A) using a combination of desktop review and field surveys.

2.1 Desktop Review

SWCA completed a desktop review of the survey area before conducting field surveys using GIS analysis. The desktop review included examining existing data from U.S. Geological Survey (USGS) topographic quadrangle maps, the National Wetlands Inventory (NWI) database, the National Hydrography Dataset (NHD), color infrared imagery, and historic and current aerial photographs of the survey area. The NWI is a U.S. Fish and Wildlife Service (USFWS) database that identifies and categorizes wetland areas based primarily on aerial imagery interpretation (USFWS 2018). Maintained by the USGS, the NHD identifies surface water systems in the United States, including lakes, streams, rivers, and canals (USGS 2018). SWCA used NRCS soil survey data (NRCS 2018b) to review area soils. This desktop review identified locations of potential aquatic resources for investigation during the field surveys.

2.2 Field Surveys

SWCA wetland biologists conducted pedestrian delineations for aquatic resources from July 30 through August 6, October 5 through 10, and October 28 through 31, 2018. The field delineations were conducted to verify the results of the desktop review and to delineate all aquatic resources in the survey area that are potential WUS.

SWCA conducted the delineations in accordance with the *Corps of Engineers Wetland Delineation Manual* (the Manual) (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (Version 2.0) (the Supplement) (USACE 2010).

A global positioning system (GPS) unit with sub-meter accuracy was used in the field to map the spatial extent of features, geographically reference datapoints, and delineate boundaries during the field surveys. GIS was used in the office to analyze the delineated features, calculate areas, and generate report maps. Please note that all data recorded using the GPS unit and displayed in the maps are for review purposes only and do not represent a professional civil survey; however, the recorded accuracy was less than 1 meter.

2.2.1 Wetlands

All potential wetlands encountered during the field surveys were investigated to determine if a wetland was present. If potential wetland characteristics were observed in an area, the wetland biologist recorded a datapoint(s) to determine the wetland status of the area. Additionally, the wetland biologist assessed all NWI polygons mapped for the survey area to determine if any of them met USACE wetland criteria. Representative photographs or datapoints were taken in these upland areas to document the lack of wetland criteria.

In the areas surveyed, wetland boundaries were delineated where all three fundamental characteristics of hydrophytic vegetation, hydric soils, and wetland hydrology were present. Wetlands that satisfy all three criteria may be subject to regulation by the USACE under Section 404 of the CWA.

The plant species identified, their percent cover, and their indicator status according to Lichvar et al. (2016) were used to indicate the presence of hydrophytic vegetation. To determine if hydric soils were present, SWCA's biologist extracted a soil profile to a sufficient depth (generally 20 inches) to document the presence or absence of all applicable hydric soil indicators. Inundation, saturation, and other physical indicators suggesting the presence of water were used to determine wetland hydrology at each site.

Wetlands were classified using the Cowardin classification system (Cowardin et al. 1979). The five principal systems are marine, estuarine, riverine, lacustrine, and palustrine. The survey area features riverine and palustrine systems.

The riverine system includes all wetlands and deep-water habitats contained within a channel except those wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens or that have habitats with ocean-derived salinities exceeding 0.5 part per thousand (‰) (Cowardin et al. 1979).

The palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens and all such wetlands that exist in tidal areas where salinity resulting from ocean-derived salts is below 0.5‰ (Cowardin et al. 1979). The palustrine system also includes wetlands lacking such vegetation but exhibiting the following four characteristics: 1) area less than 8 hectares (20 acres); 2) a lack of active wave-formed or bedrock shoreline features; 3) water depth in the deepest part of basin less than 2 meters at low water; and 4) salinity from ocean-derived salts of less than 0.5‰.

In certain situations, normal seasonal or annual variation in environmental conditions can lead to the development of "problem areas" in which wetland vegetation, hydric soils, or wetland hydrology may not be readily identifiable. These problem areas may require additional investigation to determine the presence or absence of wetland indicators. In other situations, recent human activities or natural events can create "atypical situations" in which positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation are absent or unreliable. As with problem areas, these situations may require additional investigation to determine if a wetland is present.

SWCA recorded data on USACE Midwest regional wetland determination datasheets to verify the presence and extent of wetlands (see Appendix B). Details recorded at each datapoint consisted of vegetation within prescribed sampling plots, soil characteristics, and hydrology information. The biologist recorded overview photographs of the sample area and detailed photographs of vegetation, soils, and hydrology at each datapoint (Appendix C). Datapoints that exhibited positive indicators of hydrophytic vegetation, hydric soils, and wetland hydrology were classified as wetlands. Datapoints that did not contain wetland indicators for all three criteria were classified as uplands.

2.2.1.1 VEGETATION

At each datapoint, SWCA recorded the binomial scientific name and absolute percent ground cover of all vascular plants within prescribed plot sizes for each vegetative stratum. The Supplement (USACE 2010) defines the tree stratum as a woody-stemmed plant with a trunk diameter at breast height (DBH) of equal to or greater than 3 inches, regardless of height; the sapling and shrub stratum as consisting of woody-stemmed plants with a trunk DBH of less than 3 inches, regardless of height; the herbaceous stratum as including all non-woody-stemmed plants, regardless of height; and the woody vine stratum as including all woody-stemmed vines, regardless of diameter. Typical plot size was a 30-foot radius for the tree stratum, a 15-foot radius for the sapling and shrub strata, a 5-foot radius for the herbaceous stratum, and a 30-foot radius for the woody vine stratum. However, in some instances, the biologist changed plot sizes to conform to the actual wetland size or shape. The wetland indicator status of each plant species was determined using the 2016 national wetland plant list (Lichvar et al. 2016), which divides plant species

into five categories that reflect the range of estimated probabilities of a species existing in a wetland versus an upland. The five categories of wetland indicator statuses are as follows.

- Obligate (OBL): almost always occurs in wetlands
- Facultative Wetland (FACW): usually occurs in wetlands, but may occur in non-wetlands
- Facultative (FAC): occurs in wetlands or non-wetlands
- Facultative Upland (FACU): usually occurs in non-wetlands, but may occur in wetlands
- Upland (UPL): almost never occurs in wetlands

Any plant community with greater than 50% dominant hydrophytes (OBL, FACW, and FAC) across all strata was determined to meet the USACE criteria of a hydrophytic community. In cases where disturbance had created problematic hydrophytic vegetation, visual observations of other hydrophytic vegetation indicators and site conditions, such as livestock grazing or presence of human-made features, were evaluated to clarify wetland boundaries.

2.2.1.2 SOILS

Hydric soil determinations were made according to criteria listed in the Manual (USACE 1987), the Supplement (USACE 2010), and *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils, Version 7.0* (U.S. Department of Agriculture 2010). The wetland biologist excavated soil pits to a depth of at least 20 inches and described each soil profile by horizon. Each horizon was evaluated for soil color; thickness; color, abundance, and contrast of redoximorphic features (mottles); and soil texture. Munsell soil color charts were used to determine the color of the soil matrix and redoximorphic features. The "feel" or "ribbon" test was used to determine soil texture. The soil profile was studied for the hydric soil indicators listed in the Manual (USACE 1987) and the Supplement (USACE 2010). If the soil profile displayed at least one primary or two secondary hydric soil indicators, a positive hydric soil determination was made.

Some soils that meet the hydric soil definition may not exhibit any indicators. These problematic hydric soils may lack indicators because of the color of the parent material from which the soils develop, because site conditions may inhibit the development of redoximorphic features, or because not enough time has passed to develop hydric soil indicators (USACE 2010). For areas with problematic soils, hydric soil conditions were assumed when there was a dominant hydrophytic plant community and the area exhibited wetland hydrology indicators, as listed in the Supplement (USACE 2010).

2.2.1.3 HYDROLOGY

Wetland hydrology was primarily determined in the field using the hydrology indicators detailed in the Manual (USACE 1987) and the Supplement (USACE 2010). To determine whether wetland hydrology was present at a datapoint, the SWCA biologist considered the frequency and duration of inundation; used visual observation of saturation in the upper 12 inches of the soil profile; and used the presence of other primary wetland hydrology indicators, such as oxidized root channels, water-stained leaves, surface soil cracks, water marks (nonriverine), sediment deposits (nonriverine), or the presence of biotic crusts. Secondary indicators used to determine wetland hydrology consisted of drainage patterns, the presence of a dry-season water table, or saturation visible on aerial imagery. If the area contained one or more primary hydrology indicators or two or more secondary hydrology indicators, a positive hydrology determination was made.

2.2.2 Waterbodies

All NHD flowlines and other non-wetland waterbodies (e.g., streams, rivers, canals, and ponds) encountered during the field surveys were assessed for the presence of an OHWM, which was indicated by the presence of distinguishing physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil; the absence of terrestrial vegetation; or the presence of litter and debris. Channel characteristics such as OHWM indicators, width, bank slope and height, substrate, and channel condition were recorded for each stream. Swales and erosional features without OHWMs were not delineated.

Streams with OHWMs were classified as perennial, intermittent, or ephemeral based on field observations of perceived flow regimes. A perennial stream features flowing water year-round during a typical year. The water table of a perennial stream is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow, and runoff from rainfall is a supplemental source of water for stream flow. An intermittent stream features flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not feature flowing water. Runoff from rainfall is a supplemental source of water for stream flow. An ephemeral stream features flowing water only during and shortly after precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for an ephemeral stream. Runoff from rainfall is the primary source of water for stream flow.

3 RESULTS

SWCA delineated 92 wetlands and one waterbody in the survey area. The survey area, the delineated aquatic features, and the datapoint locations are illustrated in the maps in Appendix A; datapoint datasheets are provided in Appendix B; and photographs and additional information are provided on the compact disk provided as Appendix C.

3.1 Wetlands

The wetlands delineated during the field surveys, their acreage, and the datapoint(s) associated with each delineated wetland are summarized in Table 1. The majority of delineated wetlands are palustrine emergent (PEM) as defined in Cowardin et al. (1979). Some of these wetlands extend beyond the survey area boundary; only the acreages, wetland classes, and datapoints for the portions of these wetlands that lie within the survey area boundary are summarized in Table 1. The wetland feature identification numbers listed in Table 1 correspond to the wetland feature identification numbers shown on the maps in Appendix A.

Table 1. Acreages and Associated Datapoints of Wetlands Delineated in the Study Area

Wetland Name	Wetland Acreage (acres)	Field Observed Wetland Class*	Wetland Datapoint(s)	Upland Datapoint(s)
WET001 A	0.651865	PEM	DP001	DP002
WET002	0.689831	PEM	DP001	DP002
WET004	0.594346	PEM	DP007	DP008
WET006 A & B	6.57495	PEM	DP011	DP012
WET007	0.101193	PEM	DP015	DP016
WET008	0.105337	PEM	DP015	DP016

Wetland Name	Wetland Acreage (acres)	Field Observed Wetland Class*	Wetland Datapoint(s)	Upland Datapoint(s)
WET009	0.021434	PEM	DP017	DP018
WET010	0.039063	PEM	DP019	DP020
WET011	0.100304	PEM	DP021	DP022
WET012 A & B	0.308194	PEM	DP023	DP024
WET013	5.510528	PEM	DP025	DP026
WET014	0.007968	PEM	DP027	DP028
WET015 A & B	1.143198	PEM	DP029	DP030
WET016	7.886117	PEM	DP031	DP032
WET017	1.074475	PEM	DP033	DP034
WET018	27.473046	PEM	DP035	DP036
WET019	0.108671	PEM	DP037	DP038
WET020 A & B	0.96885	PEM	DP039	DP040
WET021 B	0.146287	PEM	DP041	DP042
WET022 A & B	5.610008	PEM	DP043	DP044
WET023	0.048418	PEM	DP045	DP046
WET024	0.083392	PEM	DP047	DP048
WET025	0.381823	PEM	DP049	DP050
WET026	6.129868	PEM	DP051	DP052
WET027	0.892419	PEM	DP053	DP054
WET028	3.346795	PEM	DP055	DP056
WET029	0.137279	PEM	DP057	DP058
WET030	0.209082	PSS	DP059	DP060
WET101 A & B	0.37857	PEM	DP101	DP102
WET102 A, B, C, & D	1.158201	PEM	DP103	DP104
WET103 A & B	0.421505	PEM	DP105	DP106
WET104 A, B, & C	5.229635	PEM	DP107	DP108
WET105 A, B, & C	5.366914	PEM	DP109	DP110
WET106	0.299049	PEM	DP111	DP112
WET107	0.152879	PEM	DP113	DP114
WET108 A & B	2.309421	PEM	DP115	DP116
WET109	0.314359	PEM	DP117	DP118
WET110 A & B	0.963183	PEM	DP119	DP120
WET111 A & B	1.041629	PEM	DP121	DP122
WET112	0.425432	PEM	DP123	DP124
WET113 A & B	0.458713	PEM	DP125	DP126
WET114	0.73033	PEM	DP127	DP128
WET115	0.247635	PEM	DP127	DP128
WET116	0.238247	PEM	DP131	DP132
WET117 A, B, C, D, E, F, G, & H	2.266961	PEM	DP133	DP134
WET118	0.584801	PEM	DP135	DP136
WET119 A & B	0.482719	PEM	DP137	DP138
WET120	56.098672	PEM	DP041, DP061	DP042, DP062

Wetland Name	Wetland Acreage (acres)	Field Observed Wetland Class*	Wetland Datapoint(s)	Upland Datapoint(s)
WET121	0.278341	PEM	DP061	DP062
WET122	2.980743	PEM	DP041	DP042
WET123	0.047886	PEM	DP041	DP042
WET124	0.645507	PEM	DP041	DP042
WET125 A, B, & C	0.763011	PEM	DP041	DP042
WET127	0.884926	PEM	DP033	DP034
WET128	0.53409	PEM	DP033	DP034
WET129	0.431078	PEM	DP033	DP034
WET130	0.464512	PEM	DP039	DP040
WET131	7.770155	PEM	DP039	DP040
WET133	15.89773	PEM	DP035	DP036
WET134	0.440809	PEM	DP037	DP038
WET137	30.166541	PEM	DP145	DP146
WET138	0.540385	PEM	DP143	DP144
WET139	4.693426	PEM	DP143	DP144
WET141	69.876104	PEM	DP009, DP013	DP010, DP014
WET142	9.861895	PEM	DP007, DP017	DP008, DP018
WET144	0.233367	PEM	DP001	DP002
WET145	42.668754	PEM	DP003, DP005	DP004, DP006
WET146	0.805326	PEM	DP003, DP005	DP004, DP006
WET147	5.162234	PEM	DP003, DP005	DP004, DP006
WET148	0.186715	PEM	DP001	DP002
WET149	0.363062	PEM	DP141	DP142
WET150	0.475354	PEM	DP037	DP038
WET151	0.630666	PEM	DP039	DP040
WET152 A & B	0.032186	PEM	DP131	DP132
WET153	0.170975	PEM	DP131	DP132
WET154	0.034666	PEM	DP131	DP132
WET155	0.973598	PEM	DP127	DP128
WET156	0.195279	PEM	DP047	DP048
WET157	0.294391	PEM	DP141	DP142
WET158	0.751186	PEM	DP001	DP002
WET159	0.130907	PEM	DP146	DP147
WET160	0.819389	PEM	DP146	DP147
WET161	0.059127	PEM	DP146	DP147
WET162	0.514785	PEM	DP146	DP147
WET163	0.196313	PEM	DP 150	DP151
WET164	1.101907	PEM	DP148	DP149
WET165 A & B	2.727127	PEM	DP150	DP151
WET166	0.104714	PEM	DP150	DP151
WET167 B	0.034872	PEM	DP152	DP153
WET168 A & B	0.018934	PEM	DP152	DP153
WET169 A & B	0.208722	PEM	DP152	DP153

Wetland Name	Wetland Acreage (acres)	Field Observed Wetland Class*	Wetland Datapoint(s)	Upland Datapoint(s)
WET170	0.176111	PEM	DP041	DP042

* PEM = palustrine emergent

Additional datapoint information associated with the datasheets in Appendix B is provided in Table 2, including location, soil map unit, and the NWI polygon that is intersected with the point, if applicable.

Table 2. Additional Datapoint Information

Datapoint Number	Latitude	Longitude	Section	Township, Range	NWI Polygon	Soil Map Unit
DP001	44.63052	-96.703408	4	T113N, R49W	None	McIntosh-Badger silty clay loams
DP002	44.630163	-96.703649	4	T113N, R49W	None	McIntosh-Badger silty clay loams
DP003	44.630652	-96.700284	34	T114N, R49W	None	McIntosh-Badger silty clay loams
DP004	44.630655	-96.700401	34	T114N, R49W	None	McIntosh-Badger silty clay loams
DP005	44.632901	-96.693215	34	T114N, R49W	PEM1C	McIntosh-Lamoure silty clay loams
DP006	44.633055	-96.693248	34	T114N, R49W	None	McIntosh-Lamoure silty clay loams
DP007	44.633156	-96.662917	35	T114N, R49W	PEM1C	Lamoure-Rauville silty clay loams, channeled
DP008	44.633024	-96.662864	35	T114N, R49W	PEM1C	Kranzburg-Brookings silty clay loams
DP011	44.638821	-96.682735	35	T114N, R49W	None	Vienna-Brookings complex
DP012	44.638675	-96.682735	35	T114N, R49W	None	Kranzburg-Brookings silty clay loams
DP013	44.634391	-96.680215	35	T114N, R49W	PEM1A	Southam silty clay loam
DP014	44.634276	-96.679717	35	T114N, R49W	None	Hamerly-Badger complex
DP015	44.630481	-96.677774	2	T113N, R49W	None	Parnell silty clay loam
DP016	44.630481	-96.677672	2	T113N, R49W	None	Parnell silty clay loam
DP017	44.630692	-96.668145	35	T114N, R49W	PEM1C	Lamoure-Rauville silty clay loams, channeled
DP018	44.630633	-96.668104	35	T114N, R49W	None	Lamoure-Rauville silty clay loams, channeled
DP019	44.622978	-96.66266	1	T113N, R49W	None	McIntosh-Lamoure silty clay loams

Datapoint Number	Latitude	Longitude	Section	Township, Range	NWI Polygon	Soil Map Unit
DP020	44.62293	-96.662708	2	T113N, R49W	None	McIntosh-Lamoure silty clay loams
DP021	44.621352	-96.66266	1	T113N, R49W	None	McIntosh-Lamoure silty clay loams
DP022	44.621649	-96.662633	1	T113N, R49W	None	Vienna-Brookings complex
DP023	44.618979	-96.66271	2	T113N, R49W	None	Lamoure-Rauville silty clay loams, channeled
DP024	44.619259	-96.662681	1	T113N, R49W	None	Vienna-Brookings complex
DP025	44.610628	-96.663349	11	T113N, R49W	None	Parnell silty clay loam
DP026	44.610393	-96.663045	11	T113N, R49W	None	McIntosh-Badger silty clay loams
DP029	44.616402	-96.613423	5	T113N, R48W	None	Barnes-Svea-Buse loams
DP030	44.616452	-96.613508	5	T113N, R48W	None	Barnes-Svea-Buse loams
DP031	44.621827	-96.611002	5	T113N, R48W	None	Lowe loam
DP032	44.622912	-96.608999	5	T113N, R48W	None	Lamoure silty clay loam
DP033	44.629103	-96.631044	6	T113N, R48W	PEM1C	Parnell-Vallers complex
DP034	44.629129	-96.63123	6	T113N, R48W	None	Singsaas-Waubay silty clay loams
DP035	44.623422	-96.629531	6	T113N, R48W	PEM1C	Singsaas-Waubay silty clay loams
DP036	44.623304	-96.629436	6	T113N, R48W	PEM1C	Hamerly-Badger complex
DP037	44.621786	-96.62973	6	T113N, R48W	None	Hamerly-Badger complex
DP038	44.621843	-96.629712	6	T113N, R48W	PEM1A	Hamerly-Badger complex
DP039	44.629565	-96.622261	5	T113N, R48W	None	Singsaas-Waubay silty clay loams
DP040	44.629644	-96.622289	6	T113N, R48W	None	Singsaas-Waubay silty clay loams
DP041	44.616347	-96.623248	6	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP042	44.616298	-96.623271	6	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP043	44.616211	-96.633588	7	T113N, R48W	None	Renshaw-Sioux complex
DP044	44.616171	-96.633599	7	T113N, R48W	None	Renshaw-Sioux complex

Datapoint Number	Latitude	Longitude	Section	Township, Range	NWI Polygon	Soil Map Unit
DP045	44.612552	-96.64245	7	T113N, R48W	None	McIntosh-Lamoure silty clay loams
DP046	44.612423	-96.642479	7	T113N, R48W	None	McIntosh-Lamoure silty clay loams
DP047	44.604171	-96.641937	7	T113N, R48W	None	Barnes-Svea loams
DP048	44.604141	-96.642079	7	T113N, R48W	None	Barnes-Svea loams
DP049	44.604851	-96.644859	12	T113N, R49W	None	Hamerly-Badger complex
DP050	44.604863	-96.64479	12	T113N, R49W	None	Hamerly-Badger complex
DP051	44.60347	-96.647328	12	T113N, R49W	None	Vienna-Brookings complex
DP052	44.603568	-96.647159	12	T113N, R49W	None	Vienna-Brookings complex
DP053	44.602576	-96.643	12	T113N, R49W	None	Lamoure-Rauville silty clay loams, channeled
DP054	44.602531	-96.642899	12	T113N, R49W	None	Barnes-Svea-Buse loams
DP055	44.601707	-96.640757	7	T113N, R48W	None	Vienna-Brookings complex
DP056	44.601721	-96.640582	7	T113N, R48W	None	Vienna-Brookings complex
DP057	44.601716	-96.640376	7	T113N, R48W	None	McIntosh-Badger silty clay loams
DP058	44.601723	-96.640523	7	T113N, R48W	None	Vienna-Brookings complex
DP059	44.601477	-96.639694	18	T113N, R48W	PEM1C	McIntosh-Badger silty clay loams
DP060	44.601568	-96.63967	18	T113N, R48W	None	McIntosh-Badger silty clay loams
DP061	44.601865	-96.632233	7	T113N, R48W	PEM1C	Lamoure-Rauville silty clay loams, channeled
DP062	44.601758	-96.632211	7	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP101	44.572278	-96.581325	27	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP102	44.572288	-96.58131	27	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP103	44.57837	-96.581558	22	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP104	44.578219	-96.581539	22	T113N, R48W	None	Buse-Lamoure, channeled, complex

Datapoint Number	Latitude	Longitude	Section	Township, Range	NWI Polygon	Soil Map Unit
DP105	44.581752	-96.58167	22	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP106	44.581607	-96.581798	21	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP107	44.58727	-96.58126	22	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP108	44.587299	-96.58124	15	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP109	44.587407	-96.581291	15	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP110	44.587379	-96.581307	15	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP111	44.589585	-96.581638	15	T113N, R48W	None	Lamoure silty clay loam
DP112	44.589585	-96.581664	15	T113N, R48W	None	Lamoure silty clay loam
DP113	44.594691	-96.58186	15	T113N, R48W	PEM1Cx	Hamerly-Badger complex
DP114	44.594671	-96.581803	15	T113N, R48W	None	Hamerly-Badger complex
DP115	44.600951	-96.581933	16	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP116	44.600939	-96.581848	15	T113N, R48W	None	Lowe loam
DP117	44.601841	-96.593715	16	T113N, R48W	None	Southam silty clay loam
DP118	44.60189	-96.593724	9	T113N, R48W	None	Southam silty clay loam
DP119	44.601859	-96.602594	17	T113N, R48W	None	Parnell silty clay loam
DP120	44.602015	-96.602825	8	T113N, R48W	None	Parnell silty clay loam
DP121	44.60186	-96.612044	17	T113N, R48W	None	Hamerly-Badger complex
DP122	44.601899	-96.61206	8	T113N, R48W	None	Hamerly-Badger complex
DP123	44.59645	-96.622146	17	T113N, R48W	PEM1C	Barnes-Svea loams
DP124	44.596453	-96.622237	17	T113N, R48W	None	Barnes-Svea loams
DP125	44.593334	-96.622466	18	T113N, R48W	PEM1C	Buse-Lamoure, channeled, complex

Datapoint Number	Latitude	Longitude	Section	Township, Range	NWI Polygon	Soil Map Unit
DP126	44.593368	-96.622427	18	T113N, R48W	PEM1C	Buse-Lamoure, channeled, complex
DP127	44.587433	-96.616521	17	T113N, R48W	None	Singsaas-Waubay silty clay loams
DP128	44.587388	-96.617257	17	T113N, R48W	None	Singsaas-Waubay silty clay loams
DP131	44.594917	-96.621592	17	T113N, R48W	None	Barnes-Svea loams
DP132	44.594896	-96.621486	17	T113N, R48W	None	Barnes-Svea loams
DP133	44.580247	-96.607055	20	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP134	44.580244	-96.607007	20	T113N, R48W	None	Buse-Lamoure, channeled, complex
DP135	44.58018	-96.598356	21	T113N, R48W	PEM1Cd	Hamerly-Badger complex
DP136	44.580068	-96.598463	21	T113N, R48W	None	Hamerly-Badger complex
DP137	44.580606	-96.586098	21	T113N, R48W	PEM1C	Lamoure-Rauville silty clay loams, channeled
DP138	44.580641	-96.586132	21	T113N, R48W	None	Lamoure-Rauville silty clay loams, channeled
DP141	44.622677	-96.680138	2	T113N, R49W	PEM1Ad	Parnell-Vallers complex
DP142	44.622542	-96.679228	2	T113N, R49W	PEM1Ad	Hamerly-Badger complex
DP143	44.601928	-96.694798	10	T113N, R49W	None	Barnes-Buse loams
DP144	44.601815	-96.704664	10	T113N, R49W	None	Barnes-Buse loams
DP145	44.6089	-96.704664	9	T113N, R49W	None	Kranzburg-Brookings silty clay loams
DP146	44.608838	-96.704452	9	T113N, R49W	None	Kranzburg-Brookings silty clay loams
DP148	44.608328	-96.726288	8	T113N, R49W	None	Buse-Lamoure, channeled, complex
DP149	44.608303	-96.726247	8	T113N, R49W	None	Kranzburg-Brookings silty clay loams
DP150	44.624104	-96.723424	4	T113N, R49W	None	Kranzburg-Brookings silty clay loams
DP151	44.623817	-96.723397	4	T113N, R49W	None	Kranzburg-Brookings silty clay loams
DP152	44.589611	-96.723706	17	T113N, R49W	None	McIntosh-Lamoure silty clay loams
DP153	44.589596	-96.723667	17	T113N, R49W	None	McIntosh-Lamoure silty clay loams

3.1.1 Wetland Vegetation

The majority of wetlands delineated were dominated by emergent vegetation. Only one delineated wetland was dominated by scrub-shrub. Dominant emergent vegetation included leafy tussock sedge (*Carex aquatilis*), Nebraska sedge (*Carex nebrascensis*), large barnyard grass (*Echinochloa crus-galli*), common spike-rush (*Fraxinus pennsylvanica*), pink weed (*Persicaria pensylvanica*), reed canary grass (*Phalaris arundinacea*), Kentucky bluegrass (*Poa pratensis*), peach-leaf willow (*Salix amygdaloides*), narrow-leaf willow (*Salix exigua*), hard-stem club-rush (*Schoenoplectus acutus*), soft-stem club-rush (*Schoenoplectus tabernaemontani*), alkali cordgrass (*Spartina gracilis*), freshwater cordgrass (*Spartina pectinata*), narrow leaf cattail (*Typha angustifolia*), stinging nettle (*Urtica diocia*), and simpler's joy (*Verbena hastata*). Other dominant species were smooth brome (*Bromus inermis*), soybean (*Glycine max*), maximilian sunflower (*Helianthus maximiliani*), and timothy grass (*Phleum pratense*).

3.1.2 Wetland Soils

Wetland datapoint hydric soil indicators were dominated by Loamy Thick Dark Surface (A12). Other hydric soil indicators were Depleted Below Dark Surface (A11) and Depleted Matrix (F3).

3.1.3 Wetland Hydrology

The primary wetland hydrology indicators were Saturation (A3), Surface Water (A1), and High Water Table (A2). Secondary indicators were Geomorphic Position (D2), FAC-Neutral Test (D5), and Drainage Patterns (B10). The Inundation Visible on Aerial Imagery (B7) indicator was also present at some datapoints.

3.2 Waterbodies

Only one non-wetland waterbody was delineated within the survey area (waterbody WB101). The OHWMs of waterbody WB101 were recorded in the field using a GPS unit with submeter accuracy. Table 3 presents WB101's waterbody type, length in the survey area, waterbody acreage in the survey area, average width of the waterbody, flow regime, and primary OHWM indicator.

Table 3. Delineated Waterbody

Feature ID	Type	Length (feet)	Area (acres)	Median Width (feet)	Flow Regime	OHWMs
WB101	Stream	330	0.148	10	Perennial	Bed and banks, clear vegetation line, drifted debris

WB101 is an unnamed first order stream, located in the Fish Lake HUC12 watershed (070200030104), which is a tributary to the Lac qui Parle River. WB101 exhibited perennial flows during field surveys and desktop aerial imagery review. It is likely that this stream becomes intermittent in drought years. There is a ponded area within the OHWMs of this stream that is located in the survey area. This ponded area is likely perennial in all years except during the most extreme drought.

4 LITERATURE CITED

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. FWS/OBS-79/31. Washington, D.C.: U.S. Fish and Wildlife Service.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 Wetland Ratings. *Phytoneuron* 2016-30:1–17.

Natural Resources Conservation Service (NRCS). 2006. *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin*. United States Department of Agriculture Handbook 296. U.S. Department of Agriculture, NRCS.

———. 2018a. Ecological site description system for rangeland and forestland. U.S. Department of Agriculture. Available at: http://apps.cei.psu.edu/mlra/. Accessed June 23, 2018.

———. 2018b. Web Soil Survey. Available at: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed June 5, 2018.

U.S. Army Corps of Engineers (USACE). 1987. *Corps of Engineers Wetland Delineation Manual*. Technical Report Y-87-1. Vicksburg, Mississippi: U.S. Army Engineers Waterways Experiment Station.

———. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (Version 2.0). ERDC/EL TR-10-16. Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center, Environmental Laboratory.

U.S. Department of Agriculture. 2010. *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils, Version 7.0*. Prepared in cooperation with the National Technical Committee for Hydric Soils. Edited by G.W. Hurt, P.M. Whited, and R.F. Pringle. Fort Worth, Texas: U.S. Department of Agriculture, Natural Resources Conservation Service.

U.S. Fish and Wildlife Service (USFWS). 2018. National Wetlands Inventory. Available at: http://www.fws.gov/wetlands/. Accessed May 23, 2018.

U.S. Geological Survey (USGS). 2018. National Hydrography Dataset (NHD). Available at: http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd. Accessed May 23, 2018.

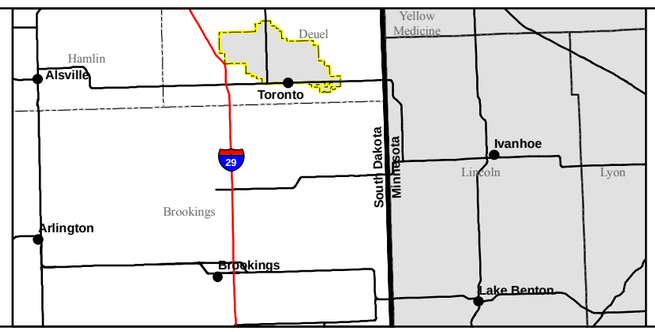
This page intentionally left blank.

APPENDIX A

Maps

Tatanka Ridge Wind Project

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary



Miles
0 1 2
0 2.5 5
Kilometers

Basemap: Topographic Map
Source: Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
Deuel County, North Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 12/18/2018

SWCA ENVIRONMENTAL CONSULTANTS

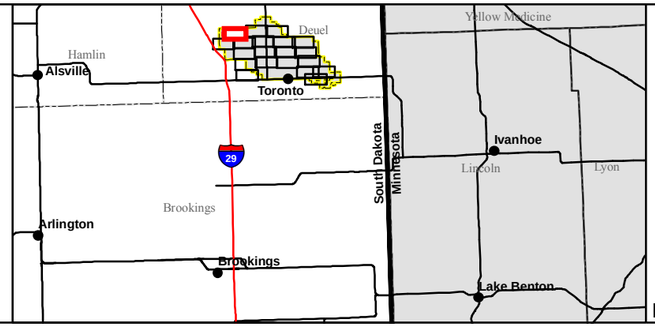
L4
L2
L5
L5
L3
L4
L4
T. 114N,
R. 49W
31
32
33
L7
L8
L8
L7
WET166
36
6
1
5
4
T. 113N,
R. 49W

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

N
W E
S

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Estilline NE (1981),
Clear Lake South (1978)
Township/Range: T114N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

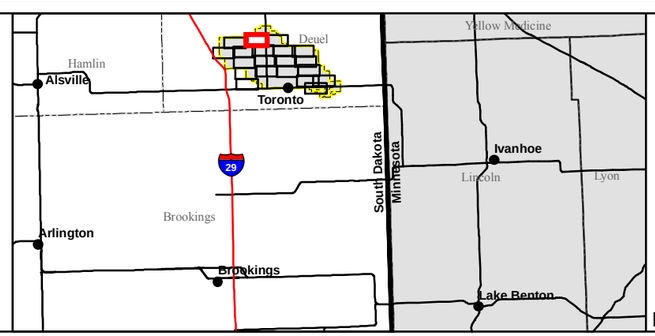
Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM

- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978)

Township/Range: T114N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

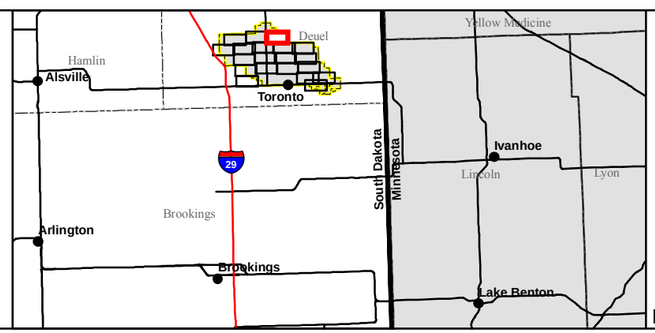
Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM

- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978)

Township/Range: T114N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

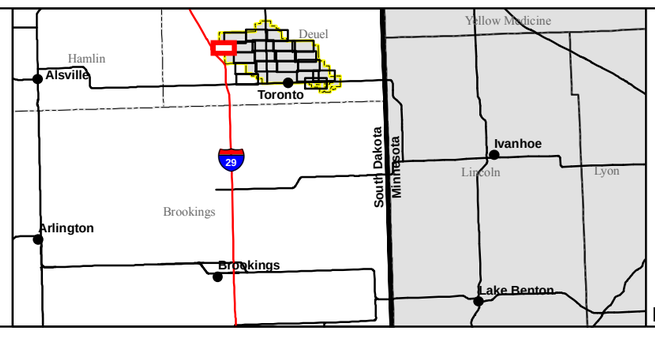
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

N
W E
S

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Estilline NE (1981),
Estilline SE (1981)
Township/Range: T113N, R50W &
T113N, R49W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

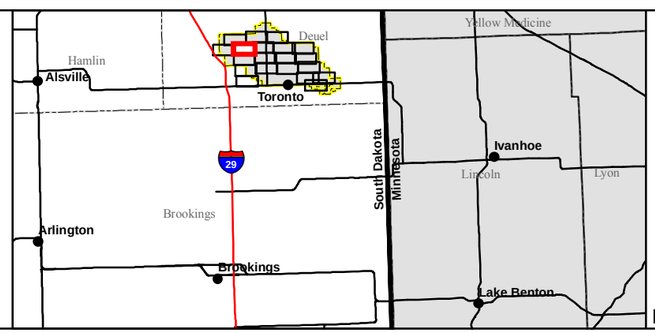
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978),
Toronto (1978)
Township/Range: T114N, R49W &
T113N, R49W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

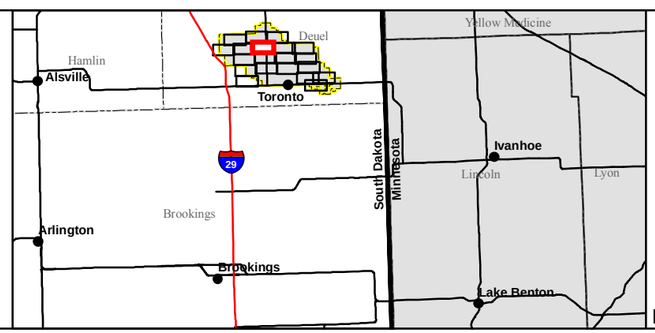
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978),
Toronto (1978)
Township/Range: T114N, R49W &
T113N, R49W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

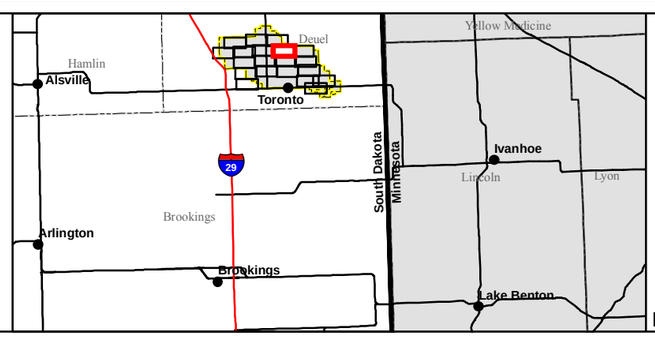
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

N
W E
S

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978),
Toronto (1978)
Township/Range: T114N, R49W &
T113N, R49W & T113N, R48W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

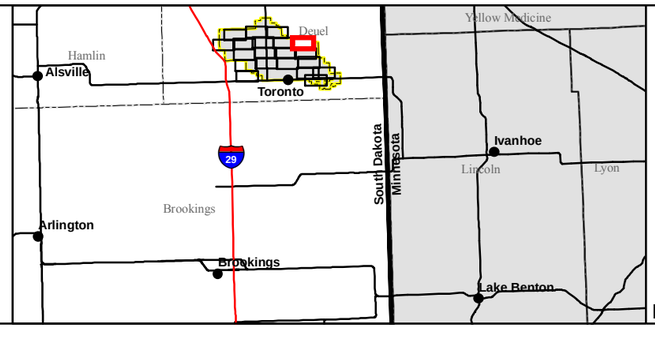
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978), Brandt (1978), Toronto (1978), Astoria (1978)
Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

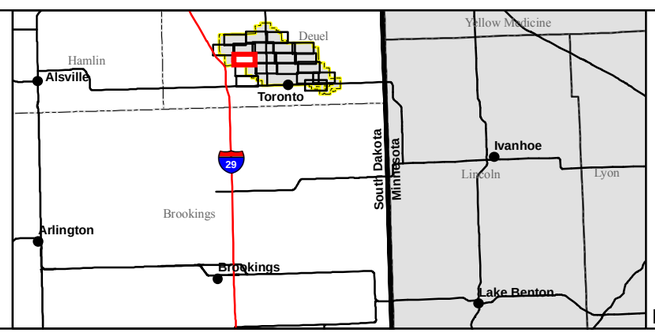
T. 113N,
R. 49W

WET164
DP149
DP148
P1
WET137
P2
P2
P3
P3
P3

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

Township/Range: T113N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

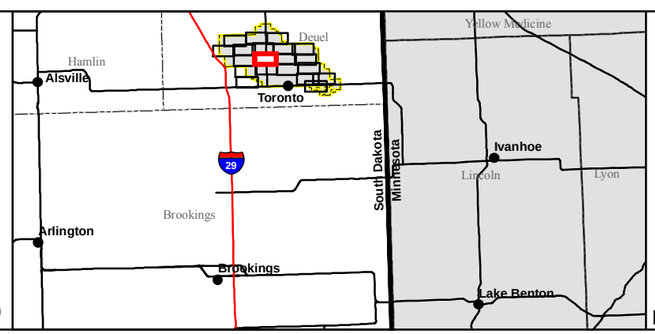
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

Township/Range: T113N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

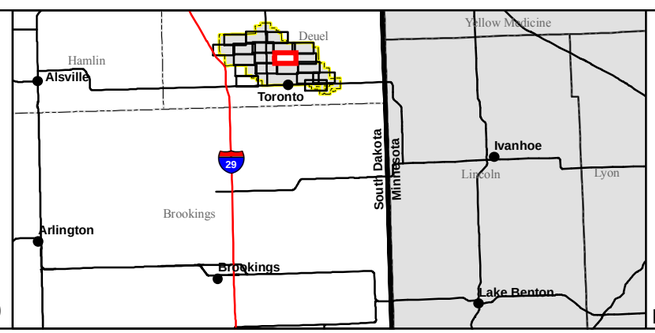
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

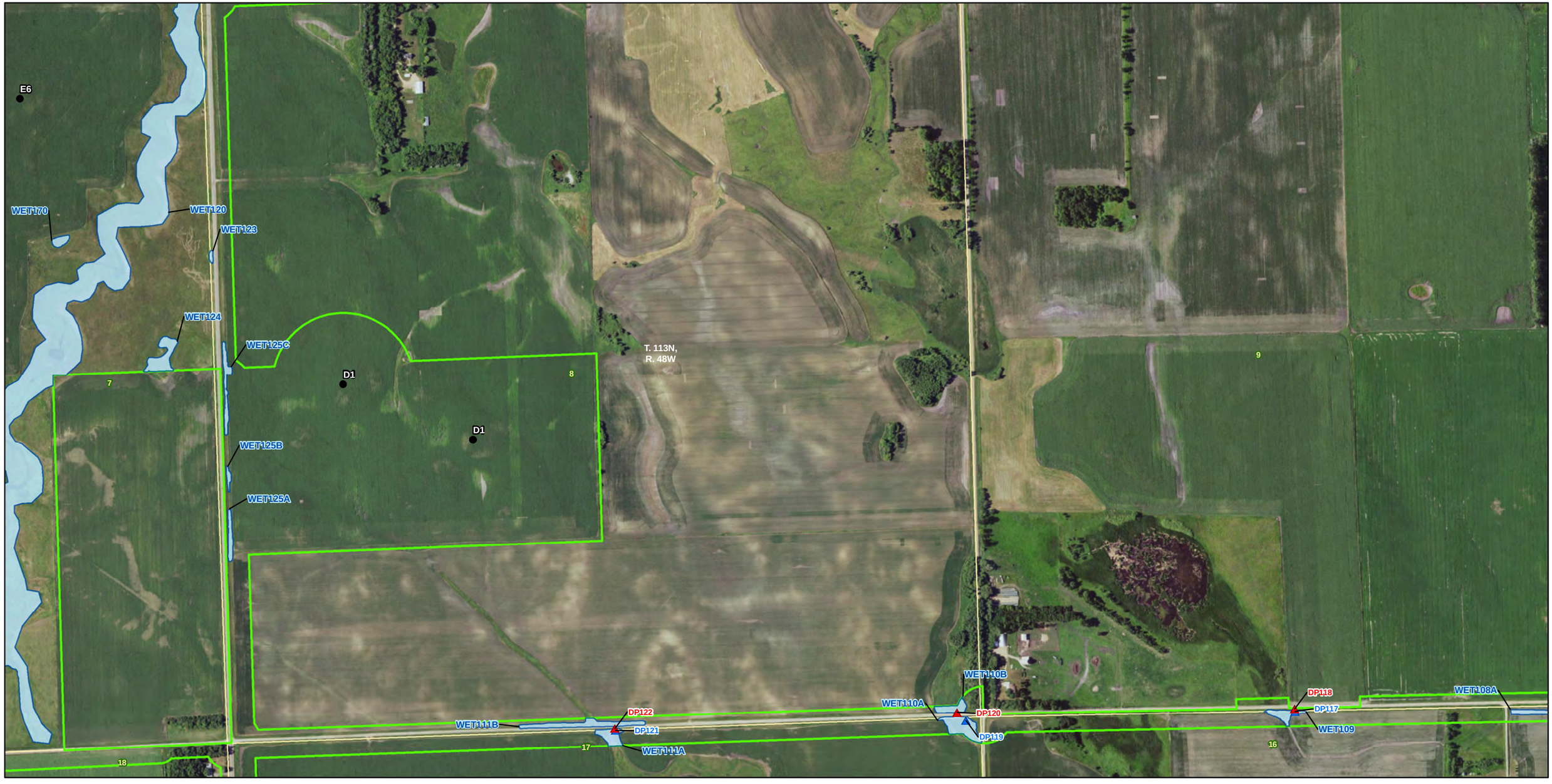
Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

Township/Range: T113N, R49W &
T113N, R48W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

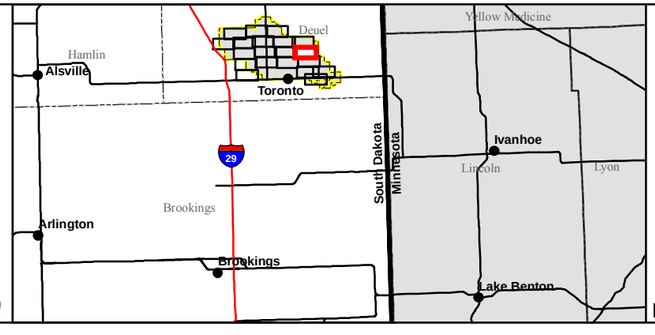


Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

N
W E
S

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978),
Astoria (1978)
Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

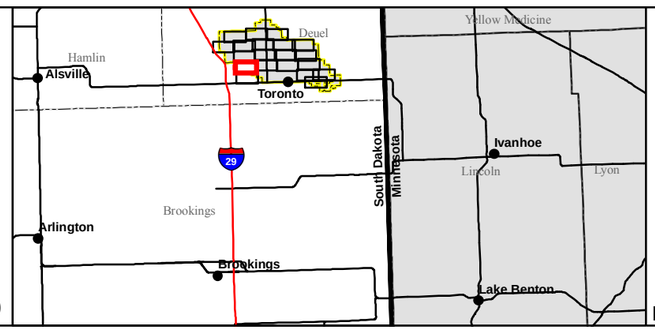
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

Township/Range: T113N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

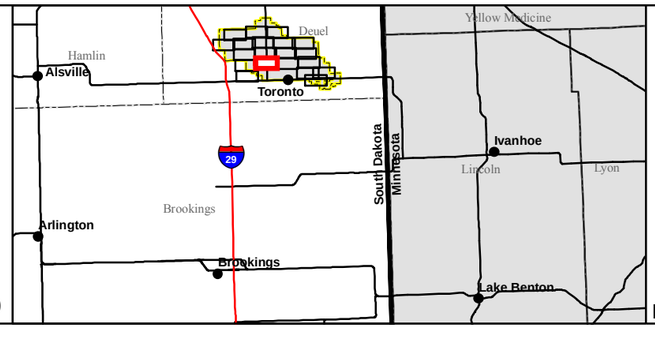
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

Township/Range: T113N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

WET026
DP054
DP053
DP055
DP058
DP056
WET027
WET029
WET030
DP060
DP057
WET028
DP059
DP061
DP062
WET120
WET121
C2
C1
C1
C4
T. 113N,
R. 49W
T. 113N,
R. 48W
WET113A
11
12
13
14
7
8
17
18

Tatanka Ridge Wind Project

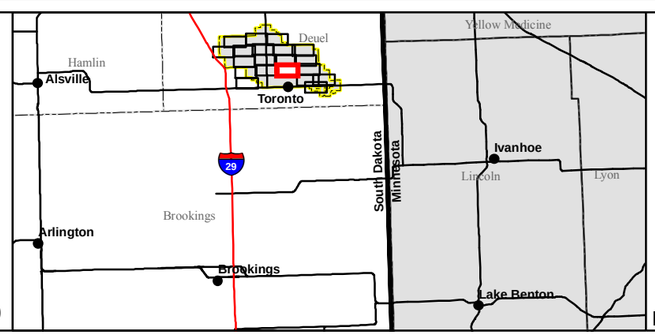
- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM

- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary

- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978),
Astoria (1978)
Township/Range: T113N, R49W &
T113N, R48W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary

OHWM

- Stream edge OHWM

Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

N
W E
S

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Astoria (1978)

Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

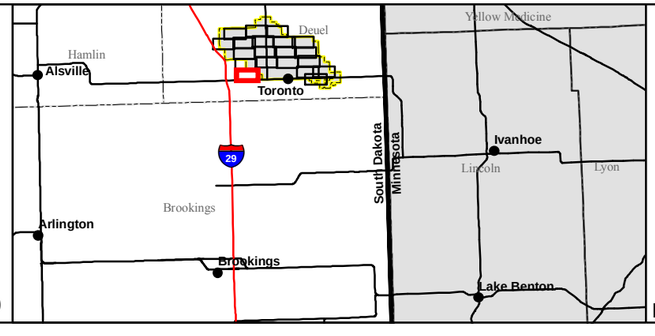
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5
0 0.25 0.5
Kilometers

N W E S

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

Township/Range: T113N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

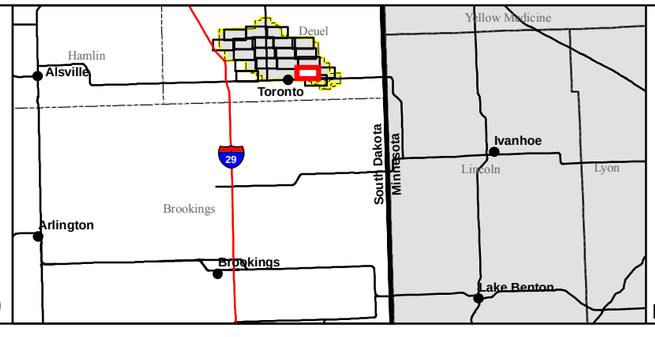
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Astoria (1978)

Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

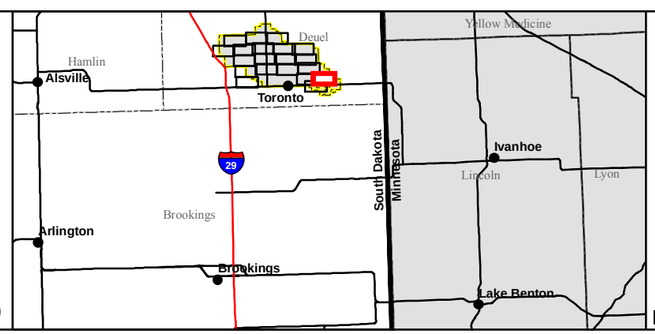
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Astoria (1978)

Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

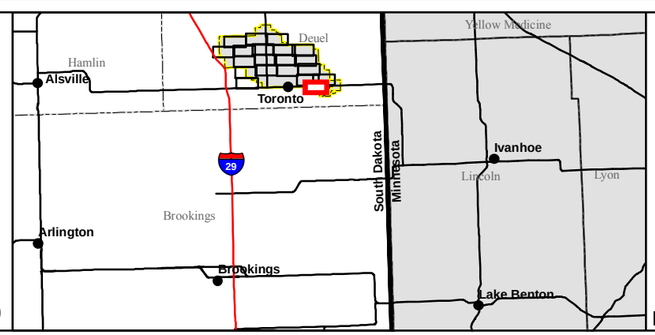
SWCA ENVIRONMENTAL CONSULTANTS

Tatanka Ridge Wind Project

- Upland Data Point
- Wetland Data Point
- Turbine Location

OHWM

- Stream edge OHWM
- Delineated Wetland
- Survey Area
- Project Boundary
- Section Boundary
- Township/Range Boundary



Miles
0 0.25 0.5

0 0.25 0.5
Kilometers

Base Map: 2017 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Astoria (1978)

Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Date: 1/3/2019

SWCA ENVIRONMENTAL CONSULTANTS

APPENDIX B

Datasheets

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP001
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Concave
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix exigua*	20%	Y	FACW
2.			
	20% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Persicaria pensylvanica*	45%	Y	FACW
2. *Phalaris arundinacea*	35%	Y	FACW
3. *Typha angustifolia*	25%	Y	OBL
4. *Spartina pectinata*	10%	N	FACW
5. *Asclepias speciosa*	7%	N	FAC
6.			
	122% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25%	x 1	25.0%
FACW species	110%	x 2	220.0%
FAC species	7%	x 3	21.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	142.0% (A)		266% (B)

Prevalence Index = B/A = 1.87

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

SOIL

Sampling Point: DP001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	
16-20	10G 3/1	60%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	X	No	___	Depth (inches): 6
Water Table Present?	Yes	X	No	___	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP002
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland Point

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Zea mays*	85%	Y	UPL
2.			
	85% = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	85%	x 5	425.0%
Column Totals:	85.0% (A)		425% (B)
Prevalence Index = B/A =	5.00		

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland cornfield adjecent to wetland.

SOIL

Sampling Point: DP002

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP003
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	60%	Y	FACW
2. *Persicaria pensylvanica*	45%	Y	FACW
3. *Asclepias speciosa*	8%	N	FAC
4.			
	113% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	105%	x 2	210.0%
FAC species	8%	x 3	24.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	113.0% (A)		234% (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

SOIL

Sampling Point: DP003

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	8	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP004
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Asclepias speciosa*	5%	N	FAC
3. *Helianthus maximiliani*	5%	N	UPL
4.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	5%	x 3	15.0%
FACU species	85%	x 4	340.0%
UPL species	5%	x 5	25.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP004

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/2	100%						

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP005
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	60%	Y	FACW
2. *Eleocharis palustris*	15%	N	OBL
3. *Typha angustifolia*	10%	N	OBL
4. *Spartina pectinata*	10%	N	FACW
5. *Asclepias speciosa*	5%	N	FAC
6.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25%	x 1	25.0%
FACW species	70%	x 2	140.0%
FAC species	5%	x 3	15.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		180% (B)

Prevalence Index = B/A = 1.80

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP005

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	108%					Clay Loam	2 INCHES OM AT SURFACE

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP006
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	30%	Y	FACU
2. *Poa pratensis*	10%	Y	FAC
3. *Helianthus maximiliani*	10%	Y	UPL
4. *Hordeum jubatum*	5%	N	FAC
5. *Calamagrostis canadensis*	5%	N	OBL
6.			
	60%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	5%	x 1	5.0%
FACW species	0%	x 2	0.0%
FAC species	15%	x 3	45.0%
FACU species	30%	x 4	120.0%
UPL species	10%	x 5	50.0%
Column Totals:	60.0% (A)		220% (B)

Prevalence Index = B/A = 3.67

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP006

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP007
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	70%	Y	FACW
2. *Persicaria pensylvanica*	5%	N	FACW
3.			
	75%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	75%	x 2	150.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	75.0% (A)		150% (B)
Prevalence Index = B/A =	2.00		

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP007

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	2 in OM AT SURFACE

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	0	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP008
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland Point

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	55%	Y	FACU
2. *Phleum pratense*	15%	N	FACU
3. *Poa pratensis*	10%	N	FAC
4. *Asclepias speciosa*	3%	N	FAC
5.			
	83% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	13%	x 3	39.0%
FACU species	70%	x 4	280.0%
UPL species	0%	x 5	0.0%
Column Totals:	83.0% (A)		319% (B)

Prevalence Index = B/A = 3.84

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland Vegetation

SOIL

Sampling Point: DP008

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No Hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP011
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	65%	Y	FACW
2. *Phalaris arundinacea*	40%	Y	FACW
3. *Schoenoplectus acutus*	20%	N	OBL
4. *Typha angustifolia*	5%	N	OBL
5.			
	130% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25%	x 1	25.0%
FACW species	105%	x 2	210.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	130.0% (A)		235% (B)

Prevalence Index = B/A = 1.81

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP011

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-6	10YR 2/2	100%					Clay Loam	2 in OM
6-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 6

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP012
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa pratensis*	35%	Y	FAC
2. *Phleum pratense*	35%	Y	FACU
3. *Bromus inermis*	30%	Y	FACU
4. *Solidago canadensis*	10%	N	FACU
5.			
	110% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	35%	x 3	105.0%
FACU species	75%	x 4	300.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		405% (B)

Prevalence Index = B/A = 3.68

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP012

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No Hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP013
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Schoenoplectus acutus*	45%	Y	OBL
2. *Schoenoplectus tabernaemontani*	25%	Y	OBL
3. *Juncus balticus*	15%	N	OBL
4. *Phalaris arundinacea*	15%	N	FACW
5. *Poa pratensis*	10%	N	FAC
6.			
	110% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	85%	x 1	85.0%
FACW species	15%	x 2	30.0%
FAC species	10%	x 3	30.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		145% (B)

Prevalence Index = B/A = 1.32

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP013

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	%	Redox Features Color:	%	Type:	Loc:	Texture:	Remarks:
0-16	10YR 2/1						Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	___	No	X	Depth (inches): NA
Water Table Present?	Yes	___	No	X	Depth (inches): NA
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 6

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 7/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP014
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	35%	Y	FACU
2. *Poa pratensis*	35%	Y	FAC
3. *Phleum pratense*	25%	Y	FACU
4. *Pascopyrum smithii*	25%	Y	FACU
5.			
	120% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	35%	x 3	105.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		445% (B)

Prevalence Index = B/A = 3.71

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP014

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP015
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
Road ditch mapped as NWI PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Persicaria pensylvanica*	85%	Y	FACW
2. *Bromus inermis*	15%	N	FACU
3. *Phalaris arundinacea*	15%	N	FACW
4. *Asclepias speciosa*	3%	N	FAC
5.			
	118%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	100%	x 2	200.0%
FAC species	3%	x 3	9.0%
FACU species	15%	x 4	60.0%
UPL species	0%	x 5	0.0%
Column Totals:	118.0% (A)		269% (B)

Prevalence Index = B/A = 2.28

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP015

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-6	10YR 3/2	100%					Clay Loam	
6-16	10YR 4/2	90%	10YR 4/6	10%	C	M	Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP016
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	75%	Y	FACU
2. *Phleum pratense*	20%	N	FACU
3. *Andropogon gerardii*	15%	N	FAC
4.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	15%	x 3	45.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		425% (B)

Prevalence Index = B/A = 3.86

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP016

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-4	10YR 4/3	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP017
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM WITHIN ROW

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	90%	Y	FACW
2. *Schoenoplectus acutus*	15%	N	OBL
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	90%	x 2	180.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		195% (B)

Prevalence Index = B/A = 1.86

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP017

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	90%	10YR 4/6	10%	C	M	Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: 3 IN ONE LAYER

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP018
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	80%	Y	FACU
2. *Phleum pratense*	25%	Y	FACU
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	105%	x 4	420.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		420% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP018

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-4	10YR 4/4	100%					Clay Loam	
4-16	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP019
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	90%	Y	FACW
2. *Urtica dioica*	15%	N	FACW
3. *Helianthus annuus*	8%	N	FACU
4.			
	113% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	105%	x 2	210.0%
FAC species	0%	x 3	0.0%
FACU species	8%	x 4	32.0%
UPL species	0%	x 5	0.0%
Column Totals:	113.0% (A)		242% (B)

Prevalence Index = B/A = 2.14

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP019

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP020
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phleum pratense*	60%	Y	FACU
2. *Bromus inermis*	45%	Y	FACU
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	105%	x 4	420.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		420% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP020

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 4/2	100%					Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP021
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	95%	Y	FACW
2. *Typha angustifolia*	7%	N	OBL
3.			
	102%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	7%	x 1	7.0%
FACW species	95%	x 2	190.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	102.0% (A)		197% (B)

Prevalence Index = B/A = 1.93

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP021

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	%	Redox Features Color:	%	Type:	Loc:	Texture:	Remarks:
0-16	10YR 2/1						Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	3	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP022
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phleum pratense*	55%	Y	FACU
2. *Bromus inermis*	35%	Y	FACU
3.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	90%	x 4	360.0%
UPL species	0%	x 5	0.0%
Column Totals:	90.0% (A)		360% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP022

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP023
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	95%	Y	FACW
2. *Typha angustifolia*	25%	Y	OBL
3.			
	120%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25%	x 1	25.0%
FACW species	95%	x 2	190.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		215% (B)

Prevalence Index = B/A = 1.79

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP023

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	3	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP024
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	55%	Y	FACU
2. *Phleum pratense*	25%	Y	FACU
3.			
	80% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	80%	x 4	320.0%
UPL species	0%	x 5	0.0%
Column Totals:	80.0% (A)		320% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP024

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 4/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA
Water Table Present?	Yes ___	No X	Depth (inches):	NA
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP025
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	40%	Y	FACW
2. *Poa pratensis*	25%	Y	FAC
3. *Echinochloa crus-galli*	15%	N	FACW
4. *Agrostis stolonifera*	5%	N	FACW
5.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	60%	x 2	120.0%
FAC species	25%	x 3	75.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	85.0% (A)		195% (B)

Prevalence Index = B/A = 2.29

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP025

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/1/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP026
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	55%	Y	FACU
2. *Phleum pratense*	35%	Y	FACU
3.			
	90%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	90%	x 4	360.0%
UPL species	0%	x 5	0.0%
Column Totals:	90.0% (A)		360% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP026

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Upland

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP029
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM. DRAINAGE FLOWS FROM NORTH INTO DITCH CROSSES ROAD

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha angustifolia*	85%	Y	OBL
2. *Phalaris arundinacea*	35%	Y	FACW
3.			
	120%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	85%	x 1	85.0%
FACW species	35%	x 2	70.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		155% (B)

Prevalence Index = B/A = 1.29

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP029

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 3

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: PEM

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP030
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	70%	Y	FACU
2. *Phleum pratense*	25%	Y	FACU
3. *Poa pratensis*	15%	N	FAC
4.			
	110% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	15%	x 3	45.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		425% (B)

Prevalence Index = B/A = 3.86

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP030

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP031
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Echinochloa crus-galli*	35%	Y	FACW
2. *Carex aquatilis*	35%	Y	OBL
3. *Hordeum jubatum*	10%	N	FAC
4.			
	80% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	35%	x 1	35.0%
FACW species	35%	x 2	70.0%
FAC species	10%	x 3	30.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	80.0% (A)		135% (B)

Prevalence Index = B/A = 1.69

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP031

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP032
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Glycine max*	60%	Y	UPL
2.			
	60% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	60%	x 5	300.0%
Column Totals:	60.0% (A)		300% (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP032

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Upland no hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP033
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Eleocharis palustris*	55%	Y	OBL
2. *Schoenoplectus tabernaemontani*	50%	Y	OBL
3. *Persicaria pensylvanica*	15%	N	FACW
4.			
	120% = Total Cover		
Woody Vine Stratum (Plot size: 1t)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	105%	x 1	105.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		135% (B)

Prevalence Index = B/A = 1.13

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP033

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	5	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP034
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Medicago sativa*	85%	Y	FACU
2.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	85.0% (A)		340% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP034

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Upland alfalfa field no hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP035
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM WITH SCATTED WILLOWS

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Echinochloa crus-galli*	90%	Y	FACW
2. *Phalaris arundinacea*	45%	Y	FACW
3.			
	135%	= Total Cover	
Woody Vine Stratum (Plot size: 14)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	135%	x 2	270.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	135.0% (A)		270% (B)
Prevalence Index = B/A =	2.00		

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM WITH SCATTERED COTTONWOOD AND WILLOWS

SOIL

Sampling Point: DP035

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP036
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland soybean field

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Glycine max*	85%	Y	UPL
2.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	85%	x 5	425.0%
Column Totals:	85.0% (A)		425% (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP036

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Upland no hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP037
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Glycine max*	80%	Y	UPL
2.			
	80% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	80%	x 5	400.0%
Column Totals:	80.0% (A)		400% (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: PEM no vegetation due to farmed land soybean field

SOIL

Sampling Point: DP037

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Soybean field

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP038
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Glycine max*	85%	Y	UPL
2.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	85%	x 5	425.0%
Column Totals:	85.0% (A)		425% (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP038

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Upland

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP039
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Eleocharis palustris*	65%	Y	OBL
2. *Carex aquatilis*	25%	Y	OBL
3. *Phalaris arundinacea*	25%	Y	FACW
4.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	90%	x 1	90.0%
FACW species	25%	x 2	50.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		140% (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP039

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 6

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/2/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP040
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	65%	Y	FACU
2. *Phleum pratense*	30%	Y	FACU
3.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP040

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 4/3	100%					Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA
Water Table Present?	Yes ___	No X	Depth (inches):	NA
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Upland. No hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP041
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM ALONG DRAINAGE IN COW PASTURE

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1. *Salix amygdaloides*	15%	Y	FACW
2.			
	15%	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
		= Total Cover	

Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	60%	Y	FACW
2. *Persicaria pensylvanica*	20%	Y	FACW
3.			
	80%	= Total Cover	

Woody Vine Stratum (Plot size: 15)		
1.		
		= Total Cover

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	95%	x 2	190.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		190% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM WITH SCATTERED WILLOWS

SOIL

Sampling Point: DP041

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Drainage flows south

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP042
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	60%	Y	FACU
2. *Phleum pratense*	20%	Y	FACU
3. *Phalaris arundinacea*	15%	N	FACW
4.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	80%	x 4	320.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		350% (B)

Prevalence Index = B/A = 3.68

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP042

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP043
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha angustifolia*	55%	Y	OBL
2. *Phalaris arundinacea*	45%	Y	FACW
3. *Spartina pectinata*	35%	Y	FACW
4. *Urtica dioica*	5%	N	FACW
5.			
	140% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	55%	x 1	55.0%
FACW species	85%	x 2	170.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	140.0% (A)		225% (B)

Prevalence Index = B/A = 1.61

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP043

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP044
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	45%	Y	FACU
2. *Phalaris arundinacea*	30%	Y	FACW
3. *Phleum pratense*	30%	Y	FACU
4. *Solidago gigantea*	5%	N	FACW
5.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	35%	x 2	70.0%
FAC species	0%	x 3	0.0%
FACU species	75%	x 4	300.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		370% (B)

Prevalence Index = B/A = 3.36

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland on access road

SOIL

Sampling Point: DP044

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP045
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM ROADSIDE DITCH

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha angustifolia*	75%	Y	OBL
2. *Phalaris arundinacea*	35%	Y	FACW
3. *Persicaria pensylvanica*	25%	N	FACW
4.			
	135%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	75%	x 1	75.0%
FACW species	60%	x 2	120.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	135.0% (A)		195% (B)

Prevalence Index = B/A = 1.44

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP045

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	6	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP046
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	65%	Y	FACU
2. *Phleum pratense*	45%	Y	FACU
3. *Persicaria pensylvanica*	10%	N	FACW
4.			
	120% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	10%	x 2	20.0%
FAC species	0%	x 3	0.0%
FACU species	110%	x 4	440.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		460% (B)

Prevalence Index = B/A = 3.83

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP046

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: NO HYDROLOGY

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP047
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa pratensis*	30%	Y	FAC
2. *Spartina pectinata*	25%	Y	FACW
3. *Phalaris arundinacea*	25%	Y	FACW
4. *Schoenoplectus acutus*	25%	Y	OBL
5.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25%	x 1	25.0%
FACW species	50%	x 2	100.0%
FAC species	30%	x 3	90.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		215% (B)

Prevalence Index = B/A = 2.05

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP047

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP048
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phleum pratense*	75%	Y	FACU
2. *Poa pratensis*	35%	Y	FAC
3. *Agrostis stolonifera*	5%	N	FACW
4.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	5%	x 2	10.0%
FAC species	35%	x 3	105.0%
FACU species	75%	x 4	300.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		415% (B)

Prevalence Index = B/A = 3.61

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP048

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP049
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Carex nebrascensis*	65%	Y	OBL
2. *Spartina pectinata*	35%	Y	FACW
3. *Panicum virgatum*	15%	N	FAC
4.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	65%	x 1	65.0%
FACW species	35%	x 2	70.0%
FAC species	15%	x 3	45.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		180% (B)

Prevalence Index = B/A = 1.57

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP049

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: PEM

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP050
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 515)			
1. *Phleum pratense*	85%	Y	FACU
2. *Poa pratensis*	20%	N	FAC
3. *Panicum virgatum*	15%	N	FAC
4.			
	120%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	35%	x 3	105.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		445% (B)

Prevalence Index = B/A = 3.71

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP050

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: NO HYDROLOGY

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP051
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM adjacent Cobb Creek

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	35%	Y	FACW
2. *Phleum pratense*	20%	Y	FACU
3. *Poa pratensis*	20%	Y	FAC
4. *Carex nebrascensis*	15%	N	OBL
5. *Schoenoplectus acutus*	15%	N	OBL
6.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	30%	x 1	30.0%
FACW species	35%	x 2	70.0%
FAC species	20%	x 3	60.0%
FACU species	20%	x 4	80.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		240% (B)

Prevalence Index = B/A = 2.29

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP051

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: PEM

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP052
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phleum pratense*	75%	Y	FACU
2. *Poa pratensis*	18%	N	FAC
3. *Axyris amaranthoides*	5%	N	UPL
4. *Asclepias speciosa*	5%	N	FAC
5.			
	103%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	23%	x 3	69.0%
FACU species	75%	x 4	300.0%
UPL species	5%	x 5	25.0%
Column Totals:	103.0% (A)		394% (B)

Prevalence Index = B/A = 3.83

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP052

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: NO HYDROLOGY

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP053
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM along Cobb Creek

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	35%	Y	FACW
2. *Phalaris arundinacea*	25%	Y	FACW
3. *Schoenoplectus acutus*	20%	N	OBL
4. *Schoenoplectus tabernaemontani*	20%	N	OBL
5. *Carex aquatilis*	15%	N	OBL
6.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	55%	x 1	55.0%
FACW species	60%	x 2	120.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		175% (B)

Prevalence Index = B/A = 1.52

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP053

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP054
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phleum pratense*	70%	Y	FACU
2. *Spartina pectinata*	20%	N	FACW
3. *Poa pratensis*	15%	N	FAC
4.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	20%	x 2	40.0%
FAC species	15%	x 3	45.0%
FACU species	70%	x 4	280.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		365% (B)

Prevalence Index = B/A = 3.48

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP054

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP055
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	90%	Y	FACW
2. *Phalaris arundinacea*	10%	N	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		200% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP055

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: PEM

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP056
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	95%	Y	FACU
2.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP056

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/4	100%						

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND POWERLINE BERM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP057
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	70%	Y	FACW
2. *Phalaris arundinacea*	30%	Y	FACW
3. *Typha angustifolia*	15%	N	OBL
4.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		215% (B)

Prevalence Index = B/A = 1.87

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP057

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes X	No ___	Depth (inches):	10	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	0	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP058
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	95%	Y	FACU
2.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP058

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/4	100%						

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP059
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PSS

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix exigua*	95%	Y	FACW
2.			
	95% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	45%	Y	FACW
2. *Urtica dioica*	15%	Y	FACW
3.			
	60% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	155%	x 2	310.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	155.0% (A)		310% (B)
Prevalence Index = B/A =	2.00		

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PSS

SOIL

Sampling Point: DP059

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PSS

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: PSS

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/3/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP060
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	95%	Y	FACU
2.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP060

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 3/4	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** X
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/4/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP061
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	45%	Y	FACW
2. *Phalaris arundinacea*	30%	Y	FACW
3. *Schoenoplectus acutus*	15%	N	OBL
4.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	75%	x 2	150.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	90.0% (A)		165% (B)

Prevalence Index = B/A = 1.83

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP061

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	3	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 8/4/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP062
Investigator(s): E. Schwartz, P. Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	65%	Y	FACU
2. *Phleum pratense*	25%	Y	FACU
3.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	90%	x 4	360.0%
UPL species	0%	x 5	0.0%
Column Totals:	90.0% (A)		360% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP062

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-16	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP101
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
NWI WETLAND ABUTTING PERENNIAL STREAM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina gracilis*	35%	Y	FACW
2. *Phalaris arundinacea*	35%	Y	FACW
3. *Carex aquatilis*	15%	N	OBL
4. *Schoenoplectus acutus*	5%	N	OBL
5. *Rumex crispus*	5%	N	FAC
6.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	20%	x 1	20.0%
FACW species	70%	x 2	140.0%
FAC species	5%	x 3	15.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		175% (B)

Prevalence Index = B/A = 1.84

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM ABUTTING STREAM AND STOCK POND

SOIL

Sampling Point: DP101

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): ___

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: Hydric soil present

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- X Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	X	No	___	Depth (inches): 3
Water Table Present?	Yes	X	No	___	Depth (inches): 5
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP102
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland point

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	45%	Y	FACU
2. *Pascopyrum smithii*	15%	Y	FACU
3. *Helianthus maximiliani*	10%	N	UPL
4. *Spartina gracilis*	5%	N	FACW
5.			
	75%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	5%	x 2	10.0%
FAC species	0%	x 3	0.0%
FACU species	60%	x 4	240.0%
UPL species	10%	x 5	50.0%
Column Totals:	75.0% (A)		300% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP102

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No HYDROLOGY PRESENT

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP103
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM WETLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	55%	Y	FACW
2. *Spartina gracilis*	30%	Y	FACW
3. *Helianthus maximiliani*	20%	N	UPL
4. *Bromus inermis*	10%	N	FACU
5. *Typha angustifolia*	8%	N	OBL
6. *Carex aquatilis*	7%	N	OBL
7.			
	130% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	85%	x 2	170.0%
FAC species	0%	x 3	0.0%
FACU species	10%	x 4	40.0%
UPL species	20%	x 5	100.0%
Column Totals:	130.0% (A)		325% (B)

Prevalence Index = B/A = 2.50

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP103

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- X Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	X	No	___	Depth (inches): 2
Water Table Present?	Yes	X	No	___	Depth (inches): 18
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP104
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): meandering channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Upland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Helianthus maximiliani*	15%	N	UPL
3. *Solidago canadensis*	10%	N	FACU
4. *Eutrochium maculatum*	5%	N	OBL
5.			
	115%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	5%	x 1	5.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	15%	x 5	75.0%
Column Totals:	115.0% (A)		460% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: Upland

SOIL

Sampling Point: DP104

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP105
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	55%	Y	FACW
2. *Typha angustifolia*	35%	Y	OBL
3. *Spartina gracilis*	20%	N	FACW
4. *Helianthus maximiliani*	10%	N	UPL
5. *Urtica dioica*	7%	N	FACW
6.			
	127% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	35%	x 1	35.0%
FACW species	82%	x 2	164.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	10%	x 5	50.0%
Column Totals:	127.0% (A)		249% (B)

Prevalence Index = B/A = 1.96

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP105

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2

Water Table Present? Yes X No ___ Depth (inches): 12

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 3

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP106
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	65%	Y	FACU
2. *Phalaris arundinacea*	30%	Y	FACW
3.			
	95%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	30%	x 2	60.0%
FAC species	0%	x 3	0.0%
FACU species	65%	x 4	260.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		320% (B)

Prevalence Index = B/A = 3.37

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP106

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP107
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM WITHIN DITCH

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	45%	Y	FACW
2. *Spartina gracilis*	40%	Y	FACW
3. *Helianthus maximiliani*	5%	N	UPL
4.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	85%	x 2	170.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	5%	x 5	25.0%
Column Totals:	90.0% (A)		195% (B)

Prevalence Index = B/A = 2.17

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP107

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2

Water Table Present? Yes X No ___ Depth (inches): 3

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP108
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	20%	N	FACW
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	20%	x 2	40.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		380% (B)

Prevalence Index = B/A = 3.62

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP108

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	%	Redox Features Color:	%	Type:	Loc:	Texture:	Remarks:
0-20	10YR 3/1						Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP109
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	65%	Y	FACW
2. *Spartina gracilis*	35%	Y	FACW
3. *Typha angustifolia*	30%	Y	OBL
4.			
	130% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	30%	x 1	30.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	130.0% (A)		230% (B)

Prevalence Index = B/A = 1.77

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP109

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes X	No ___	Depth (inches):	8	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	2	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/5/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP110
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	55%	Y	FACW
2. *Spartina pectinata*	30%	Y	FACW
3. *Typha angustifolia*	20%	N	OBL
4.			
	105% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	20%	x 1	20.0%
FACW species	85%	x 2	170.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		190% (B)

Prevalence Index = B/A = 1.81

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

SOIL

Sampling Point: DP110

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP111
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM ROAD DITCH

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix exigua*	15%	Y	FACW
2.			
	15% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	55%	Y	FACW
2. *Spartina pectinata*	30%	Y	FACW
3. *Typha angustifolia*	10%	N	OBL
4.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	10%	x 1	10.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		210% (B)

Prevalence Index = B/A = 1.91

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP111

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	6	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP112
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	80%	Y	FACU
2. *Phalaris arundinacea*	15%	N	FACW
3.			
	95%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	80%	x 4	320.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		350% (B)

Prevalence Index = B/A = 3.68

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP112

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 4/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP113
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	75%	Y	FACW
2. *Spartina pectinata*	25%	Y	FACW
3. *Asclepias speciosa*	5%	N	FAC
4.			
	105% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	100%	x 2	200.0%
FAC species	5%	x 3	15.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		215% (B)

Prevalence Index = B/A = 2.05

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP113

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	6	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP114
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	95%	Y	FACU
2.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP114

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 4/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: YES ROAD BASE PRESENT

Depth (inches): 12

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP115
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	75%	Y	FACW
2. *Spartina pectinata*	35%	Y	FACW
3. *Typha angustifolia*	5%	N	OBL
4.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	5%	x 1	5.0%
FACW species	110%	x 2	220.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		225% (B)

Prevalence Index = B/A = 1.96

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP115

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	10	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP116
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?**	**Yes No X**
Hydric Soil Present?	Yes	No X		
Wetland Hydrology Present?	Yes	No X		

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	95%	Y	FACU
2.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes No X**

Remarks: UPLAND

SOIL

Sampling Point: DP116

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: YES ROAD BASE

Depth (inches): 12

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP117
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	65%	Y	FACW
2. *Spartina pectinata*	25%	Y	FACW
3. *Typha angustifolia*	15%	N	OBL
4.			
	105% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	90%	x 2	180.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		195% (B)

Prevalence Index = B/A = 1.86

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP117

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	___	No	X	Depth (inches): NA
Water Table Present?	Yes	___	No	X	Depth (inches): NA
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 6

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP118
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	20%	N	FACW
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	20%	x 2	40.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		380% (B)

Prevalence Index = B/A = 3.62

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP118

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP119
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	75%	Y	FACW
2. *Spartina pectinata*	25%	Y	FACW
3. *Typha angustifolia*	15%	N	OBL
4.			
	115% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	115.0% (A)		215% (B)

Prevalence Index = B/A = 1.87

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP119

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	8	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP120
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	10%	N	FACW
3.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	10%	x 2	20.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		360% (B)

Prevalence Index = B/A = 3.79

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP120

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP121
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	85%	Y	FACW
2. *Spartina pectinata*	25%	Y	FACW
3.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	110%	x 2	220.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		220% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP121

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	12	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP122
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	75%	Y	FACU
2. *Phalaris arundinacea*	25%	Y	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	25%	x 2	50.0%
FAC species	0%	x 3	0.0%
FACU species	75%	x 4	300.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		350% (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP122

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 4/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP123
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM ROAD DITCH

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	85%	Y	FACW
2. *Spartina pectinata*	25%	Y	FACW
3.			
	110% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	110%	x 2	220.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		220% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP123

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	10	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP124
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	15%	N	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		370% (B)

Prevalence Index = B/A = 3.70

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP124

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP125
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	55%	Y	FACW
2. *Spartina pectinata*	45%	Y	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		200% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP125

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	8	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP126
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	15%	N	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		370% (B)

Prevalence Index = B/A = 3.70

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP126

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP127
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	75%	Y	FACW
2. *Spartina pectinata*	35%	Y	FACW
3.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	110%	x 2	220.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		220% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP127

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/6/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP128
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	20%	N	FACW
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	20%	x 2	40.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		380% (B)

Prevalence Index = B/A = 3.62

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP128

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/3	100%					Sandy Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP131
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	85%	Y	FACW
2. *Bromus inermis*	15%	N	FACU
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	85%	x 2	170.0%
FAC species	0%	x 3	0.0%
FACU species	15%	x 4	60.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		230% (B)

Prevalence Index = B/A = 2.30

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP131

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-8	10YR 2/1	100%					Clay Loam	
8-20	10YR 2/1	95%	10YR 4/6	5%			Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: PEM

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP132
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	80%	Y	FACU
2. *Spartina pectinata*	15%	N	FACW
3.			
	95%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	80%	x 4	320.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		350% (B)

Prevalence Index = B/A = 3.68

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP132

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP133
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	35%	Y	FACW
2. *Phalaris arundinacea*	35%	Y	FACW
3. *Schoenoplectus acutus*	25%	Y	OBL
4. *Carex aquatilis*	15%	N	OBL
5.			
	110% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	40%	x 1	40.0%
FACW species	70%	x 2	140.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	110.0% (A)		180% (B)

Prevalence Index = B/A = 1.64

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP133

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-4	10YR 2/1	100%					Clay Loam	
4-20	10YR 2/1	75%	10YR 4/6	25%			Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 3

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP134
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Andropogon gerardii*	55%	Y	FAC
2. *Sorghastrum nutans*	15%	N	FACU
3. *Bromus inermis*	15%	N	FACU
4. *Bouteloua curtipendula*	5%	N	UPL
5.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	55%	x 3	165.0%
FACU species	30%	x 4	120.0%
UPL species	5%	x 5	25.0%
Column Totals:	90.0% (A)		310% (B)

Prevalence Index = B/A = 3.44

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: UPLAND

SOIL

Sampling Point: DP134

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
20	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP135
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	85%	Y	FACW
2. *Spartina pectinata*	20%	N	FACW
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	105%	x 2	210.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		210% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP135

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP136
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phalaris arundinacea*	15%	N	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		370% (B)

Prevalence Index = B/A = 3.70

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP136

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP137
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	80%	Y	FACW
2. *Spartina pectinata*	15%	N	FACW
3. *Bromus inermis*	10%	N	FACU
4.			
	105% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	95%	x 2	190.0%
FAC species	0%	x 3	0.0%
FACU species	10%	x 4	40.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		230% (B)

Prevalence Index = B/A = 2.19

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP137

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-6	10YR 2/1	100%					Clay Loam	
6-20	10YR 2/1	90%	10YR 4/6	10%	C	M	Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/7/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP138
Investigator(s): Paul SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	50%	Y	FACU
2.			
	50% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	50%	x 4	200.0%
UPL species	0%	x 5	0.0%
Column Totals:	50.0% (A)		200% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND adjacent to harvested Soybean

SOIL

Sampling Point: DP138

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
20	10YR 3/1						Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/13/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP141
Investigator(s): P. Swartzinski; R. Walker Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:
PEM WITHIN SOYBEAN FIELD

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1.			
	= Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	#Type! (A)		#Type! (B)
Prevalence Index = B/A =			#Type!

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: SOYBEAN FIELD HARVESTED NO VEGETATION

SOIL

Sampling Point: DP141

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: SOYBEAN FIELD

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/13/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP142
Investigator(s): P. Swartzinski; R. Walker Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phleum pratense*	20%	N	FACU
3. *Phalaris arundinacea*	15%	N	FACW
4.			
	120%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	15%	x 2	30.0%
FAC species	0%	x 3	0.0%
FACU species	105%	x 4	420.0%
UPL species	0%	x 5	0.0%
Column Totals:	120.0% (A)		450% (B)

Prevalence Index = B/A = 3.75

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP142

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/13/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP143
Investigator(s): P. Swartzinski; R. Walker Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM WITHIN DRAINAGE

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	75%	Y	FACW
2. *Spartina pectinata*	35%	Y	FACW
3. *Carex nebrascensis*	8%	N	OBL
4.			
	118% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	8%	x 1	8.0%
FACW species	110%	x 2	220.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	118.0% (A)		228% (B)

Prevalence Index = B/A = 1.93

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP143

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-4	10YR 2/1	100%						
4-20	10YR 2/1	85%	10YR 4/6	15%	C	M	Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 6

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/13/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP144
Investigator(s): P. Swartzinski; R. Walker Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	75%	Y	FACU
2. *Phalaris arundinacea*	25%	Y	FACW
3. *Phleum pratense*	25%	Y	FACU
4.			
	125% = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	25%	x 2	50.0%
FAC species	0%	x 3	0.0%
FACU species	100%	x 4	400.0%
UPL species	0%	x 5	0.0%
Column Totals:	125.0% (A)		450% (B)

Prevalence Index = B/A = 3.60

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP144

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%						

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/13/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP145
Investigator(s): P. Swartzinski; R. Walker Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM WITHIN DRAINAGE

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	70%	Y	FACW
2. *Spartina pectinata*	35%	Y	FACW
3. *Phleum pratense*	10%	N	FACU
4. *Schoenoplectus acutus*	4%	N	OBL
5.			
	119%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	4%	x 1	4.0%
FACW species	105%	x 2	210.0%
FAC species	0%	x 3	0.0%
FACU species	10%	x 4	40.0%
UPL species	0%	x 5	0.0%
Column Totals:	119.0% (A)		254% (B)

Prevalence Index = B/A = 2.13

Hydrophytic Vegetation Indicators:

Y 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
Y 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP145

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	5	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/13/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP146
Investigator(s): P. Swartzinski; R. Walker Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	85%	Y	FACU
2. *Phleum pratense*	20%	N	FACU
3. *Helianthus maximiliani*	5%	N	UPL
4.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	105%	x 4	420.0%
UPL species	5%	x 5	25.0%
Column Totals:	110.0% (A)		445% (B)

Prevalence Index = B/A = 4.05

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP146

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: UPLAND

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/29/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP146
Investigator(s): Paul Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Phalaris arundinacea*	55%	Y	FACW
2. *Verbena hastata*	25%	Y	FACW
3. *Rumex crispus*	15%	N	FAC
4.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	80%	x 2	160.0%
FAC species	15%	x 3	45.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		205% (B)

Prevalence Index = B/A = 2.16

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP146

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/29/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP147
Investigator(s): Paul Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	DominantSpecies?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Zea mays*	15%	Y	UPL
2.			
	15% = Total Cover		
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	15%	x 5	75.0%
Column Totals:	15.0% (A)		75% (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND CORNFIELD

SOIL

Sampling Point: DP147

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA
Water Table Present?	Yes ___	No X	Depth (inches):	NA
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/30/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP148
Investigator(s): PAUL SWARTZINSKI Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Phalaris arundinacea*	90%	Y	FACW
2. *Spartina pectinata*	10%	N	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		200% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP148

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1

Water Table Present? Yes X No ___ Depth (inches): 9

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/30/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP149
Investigator(s): Paul Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
UPLAND

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Bromus inermis*	85%	Y	FACU
2. *Zea mays*	15%	N	UPL
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	85%	x 4	340.0%
UPL species	15%	x 5	75.0%
Column Totals:	100.0% (A)		415% (B)

Prevalence Index = B/A = 4.15

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP149

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/30/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP150
Investigator(s): Paul Swartzinsk8 Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30ft)			
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Phalaris arundinacea*	75%	Y	FACW
2. *Spartina pectinata*	20%	N	FACW
3. *Carex nebrascensis*	5%	N	OBL
4. *Schoenoplectus acutus*	5%	N	OBL
5.			
	105% = Total Cover		
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	10%	x 1	10.0%
FACW species	95%	x 2	190.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		200% (B)

Prevalence Index = B/A = 1.90

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP150

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 2/1	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks: PEM

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/30/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP151
Investigator(s): Paul Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Linear Slope
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?**	**Yes No X**
Hydric Soil Present?	Yes	No X		
Wetland Hydrology Present?	Yes	No X		

Remarks:
UPLAND DATA POINT FOR WET165

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Bromus inermis*	90%	Y	FACU
2. *Phalaris arundinacea*	10%	N	FACW
3.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	10%	x 2	20.0%
FAC species	0%	x 3	0.0%
FACU species	90%	x 4	360.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		380% (B)

Prevalence Index = B/A = 3.80

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes No X**

Remarks: UPLAND

SOIL

Sampling Point: DP151

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP152
Investigator(s): Paul Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?**	**Yes X No**
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
PEM

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Phalaris arundinacea*	90%	Y	FACW
2. *Spartina pectinata*	15%	N	FACW
3.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	105%	x 2	210.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	105.0% (A)		210% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
Y 2 - Dominance Test if >50%
Y 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: PEM

SOIL

Sampling Point: DP152

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-4	10YR 2/1	100%					Clay Loam	
4-20	10YR 2/1	80%	10YR 4/6	20%	C	M	Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): 4

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Tatanka Ridge Wind Project City/County: Deuel County Sampling Date: 10/31/2018
Applicant/Owner: Buffalo Ridge III, LLC State: SD Sampling Point: DP153
Investigator(s): Paul Swartzinski Section, Township, Range: , ,
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none):
Slope (%): <5% Lat: Long: Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5ft)			
1. *Bromus inermis*	95%	Y	FACU
2.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15ft)			
1.			
	= Total Cover		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	95%	x 4	380.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		380% (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

N 1 - Rapid Test for Hydrophytic Vegetation
N 2 - Dominance Test if >50%
N 3 - Prevalence Index is ≤ 3.0
N 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
N Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks: UPLAND

SOIL

Sampling Point: DP153

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
0-20	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ___ Coast Prairie Redoc (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Pattern (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	NA	
Water Table Present?	Yes ___	No X	Depth (inches):	NA	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C

Additional Documentation

See attached CD, which contains photographs of aquatic features and their associated data points and GIS Shapefiles of the delineated features

Appendix D

Dakota Skipper and Poweshiek Skipperline Survey Reports

DAKOTA SKIPPER (*HESPERIA DACOTAE*) AND POWESHIEK SKIPPERLING (*OARISMA POWESHIEK*) SURVEY REPORT FOR THE TATANKA RIDGE WIND PROJECT, DEUEL COUNTY, SOUTH DAKOTA

AUGUST 2018

PREPARED FOR

Buffalo Ridge III, LLC

PREPARED BY

SWCA Environmental Consultants

DAKOTA SKIPPER (*HESPERIA DACOTAE*) AND POWESHIEK SKIPPERLING (*OARISMA POWESHIEK*) SURVEY REPORT FOR THE TATANKA RIDGE WIND PROJECT, DEUEL COUNTY, SOUTH DAKOTA

Prepared for

Buffalo Ridge III, LLC
1125 NW Couch Street
Portland, Oregon 97209

Prepared by

SWCA Environmental Consultants
116 North 4th Street
Bismarck, North Dakota 58501
(701) 258-6622
www.swca.com

August 2018

CONTENTS

1 Introduction 1

2 Methodology 3

2.1 Desktop Review 3

2.2 Habitat Surveys 3

2.3 Adult Protocol Surveys 3

3 Results and Discussion 4

4 References Cited 11

Appendices

Appendix A Results Maps
Appendix B USFWS Survey Request Approval
Appendix C Survey Butterfly Count
Appendix D USFWS Flowering Plants Count

Figures

Figure 1. Project overview map. 2
Figure 2. Smooth brome-dominated site, with few prairie coneflowers and native thistle, along with small patches of big bluestem. 5
Figure 3. Low-lying site with smooth deathcamas, pale-spike lobelia, Canada goldenrod, and candle anemone. 6
Figure 4. Area dominated by big bluestem, porcupinegrass, and switchgrass, with Aster sp., smooth deathcamas, sideoats grama, purple prairie clover, and few purple coneflower. 6
Figure 5. Purple coneflower, purple prairie clover, big bluestem, and some little bluestem. 7
Figure 6. Orchardgrass-dominated site. 8
Figure 7. Smooth brome- and alfalfa-dominated site 8
Figure 8. Smooth brome-dominated site with a relict population of porcupinegrass. 9

Tables

Table 1. Survey Rounds 9

This page intentionally left blank.

1 INTRODUCTION

The Dakota skipper (*Hesperia dacotae*) and Poweshiek skipperling (*Oarisma poweshiek*) are listed as threatened and endangered under the Endangered Species Act, respectively, by the U.S. Fish and Wildlife Service (USFWS). These species are not listed under the South Dakota Endangered Species Law. SWCA Environmental Consultants (SWCA) was contracted by Buffalo Ridge III, LLC (Buffalo Ridge III), a subsidiary of Avangrid Renewables, LLC, to conduct adult presence/absence protocol surveys for these two species for the Tatanka Ridge Wind Project (Project), located in Deuel County, South Dakota (Figure 1). The purpose of the surveys were to meet USFWS guidelines (USFWS 2018) on assessment of the Dakota skipper and Poweshiek skipperling.

The Project is located approximately 5 miles west of the South Dakota/Minnesota border, and directly north of the town of Toronto, South Dakota.The Project boundary encompasses 22,905 total acres (approximately 36 square miles), with over 99% of the Project located on private lands, and less than 1% within the Deuel County Waterfowl Production Area, which is located in the eastern portion of the Project. The proposed Project will have a nameplate capacity of up to 99 megawatts, consisting of wind turbines and associated infrastructure such as access roads, electrical collection system, substation, operations and maintenance building, and a permanent meteorological tower.

Per USFWS (2018) guidelines, a survey area was identified that included the potential infrastructure disturbance area and an 820-foot (250-meter [m]) buffer (Figure 1). A desktop review of the survey area was conducted to identify undisturbed grassland areas that could be potential habitat for the Dakota skipper and Poweshiek skipperling. Pedestrian habitat surveys were conducted within the Project area potential habitat to field-verify suitable habitat for adult Dakota skipper and Poweshiek skipperling. Three rounds of adult protocol surveys for the Dakota skipper and Poweshiek skipperling were conducted in June and July 2018, during the flight period for these two species.

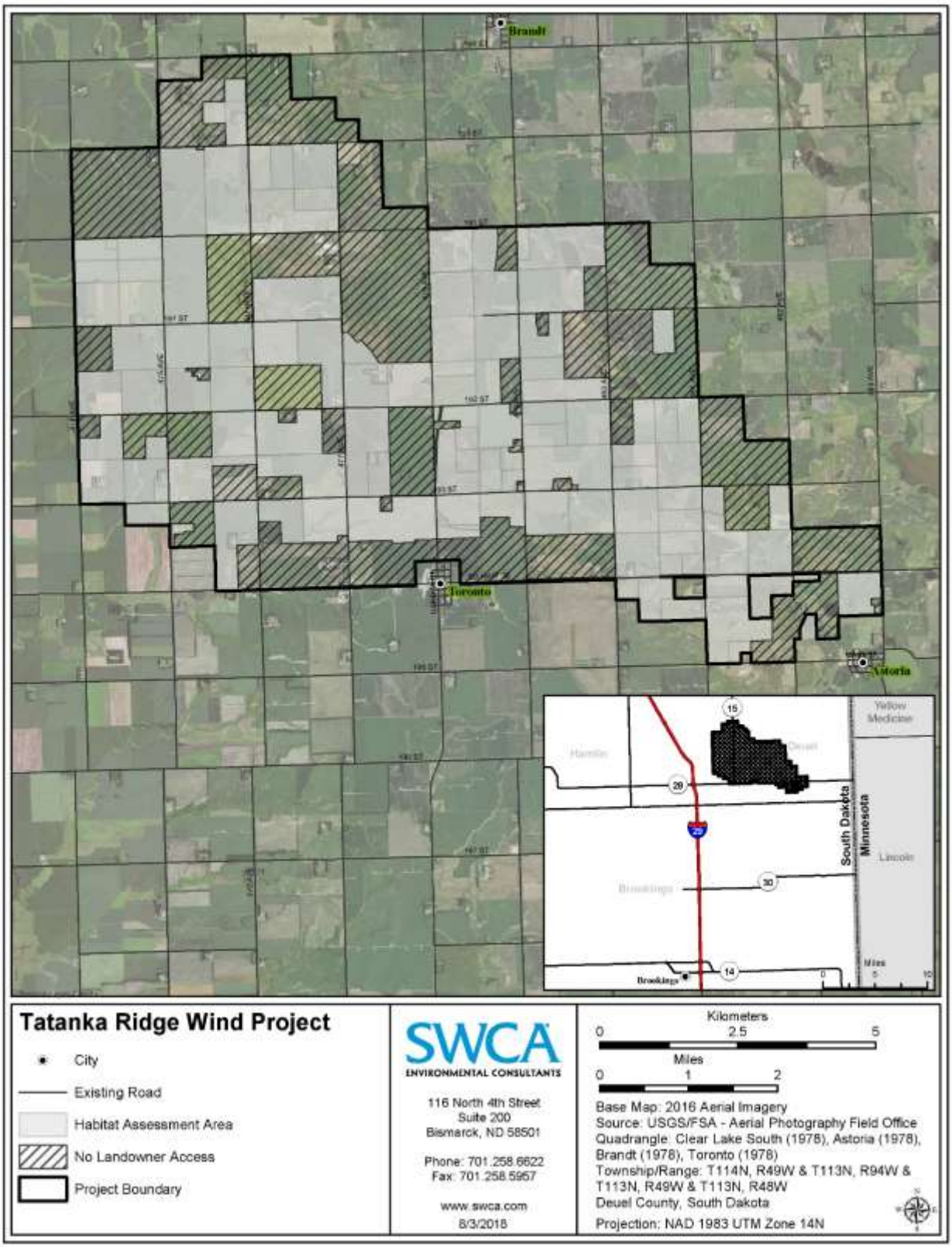


Figure 1. Project overview map.

2 METHODOLOGY

The surveys were conducted in a three-step approach: desktop review, habitat surveys, and adult protocol surveys, in accordance with USFWS (2018) guidelines.

2.1 Desktop Review

A desktop review of the leased lands within the Project was completed in geographic information system (GIS) to identify potential habitat polygons and prioritize areas requiring field verification (Stantec Consulting Services Inc [Stantec] 2018). The desktop review was conducted within areas of the Project boundary where land access was granted (Assessment Area). The Assessment Area is illustrated in Figure 1, above. The desktop review started by importing Buffalo Ridge III's undisturbed grassland layer (Western Ecosytems Technology, Inc 2018; provided to SWCA by Buffalo Ridge III) and reviewing aerial imagery to further refine the layer, where possible, for Dakota skipper and Poweshiek skipperling habitat. The portions of the Assessment Area that appeared to be uncultivated grassland were identified as potential habitat and carried forward for field habitat surveys.

2.2 Habitat Surveys

Habitat surveys were completed by SWCA and Stantec (SWCA subcontractor) biologists to field-verify whether the potential habitat identified during the desktop review was suitable or unsuitable habitat for the Dakota skipper and Poweshiek skipperling. The surveys were completed on all potential habitat areas on leased lands (those identified during the desktop review) where (see maps in Appendix A). The habitat surveys were conducted from June 23 through 28, 2018, by qualified biologists. Suitable habitat determinations were made based on habitat characteristics outlined in the published literature (Rigney 2013; Royer and Marrone 1992a; Royer and Marrone 1992b; Selby 2013; Skadsen 2003; USFWS 2014, 2016, 2018).

Habitat survey field data was used to create a GIS polygon layer of field-verified suitable habitat for the Dakota skipper and Poweshiek skipperling. Field-verified suitable habitat were carried forward for adult protocol surveys (see maps in Appendix A).

2.3 Adult Protocol Surveys

Three rounds of Dakota skipper and Poweshiek skipperling adult protocol surveys were completed in the suitable habitat target areas between June 29 and July 12, 2018, with 48 hours between survey rounds. The surveys were led by Jake Powell, SWCA Senior Ecologist, and Dr. David Lightfoot, SWCA Ecologist, who are both listed on SWCA's Scientific Recovery Permit for the Dakota skipper and Poweshiek skipperling (permit number TE64070B-1).

The adult protocol surveys followed the 2018 Dakota Skipper Survey Protocols (USFWS 2018) as required by the survey request approval from the USFWS South Dakota Field Office (letter sent to Jake Powell, SWCA Senior Ecologist, from Scott Larson, USFWS South Dakota Field Office Field Supervisor, dated June 13, 2018), see Appendix B. The survey fell within the adult flight period of these two species.

SWCA used a modified "Pollard-style random walk" method to conduct the surveys (Royer et al. 1998). The permitted surveyors walked with insect nets at approximately 35 m per minute within the suitable habitat areas. As they walked, the surveyors scanned the area within a 5-m box (5 m on each side, within

5 m of the ground, or 5 m to the front). If identified, only Dakota skippers, or other sensitive butterflies, identified within the box were recorded.

SWCA conducted the surveys between 1000 and 1730 hours (10:00 a.m.–5:30 p.m.) Central Daylight Time. The surveys were conducted within the environmental constraints listed below, as outlined by the USFWS (2018) survey methodology.

- No surveys during fog, drizzle, or rain.
- No surveys when sustained or gusting winds that average greater than 30 kilometers (19 miles) per hour measured over a 30-second period at a height of 1.2 to 1.8 m (4–6 feet) above ground level (Beaufort Scale of 5 or greater).
- No surveys when temperature in the shade at ground level is less than 21 degrees Celsius (70 degrees Fahrenheit) when cloud cover is less than 50% or less than 30 degrees Celsius (86 degrees Fahrenheit) when cloud cover is 50% or more.

One to two additional surveyors worked under direct supervision of Mr. Powell or Dr. Lightfoot during the surveys. The entirety of each target area polygon was covered by the surveyors.

Additional information collected during the surveys included other butterfly species observed (Appendix C) and a general count of flowering plants (Appendix D), as requested by the USFWS (2018).

3 RESULTS AND DISCUSSION

The desktop review resulted in 3,705.0 acres of potential habitat. The potential habitat was field verified from June 23 through 28, and SWCA determined that approximately 41.5 acres was suitable for the two species. These areas are shown on the maps in Appendix A.

Suitable habitat has the potential to be used by the Dakota skipper and Poweshiek skipperling during their larval stages and the adult flight period. Unsuitable habitat includes areas that do not have the potential to be used by the Dakota skipper and Poweshiek skipperling.

The majority of the suitable habitat verified in the survey area was marginal with a lowered potential for maintaining a viable population. These areas had few, scattered nectar species, were small in size area, had poor juxtaposition in relation other suitable habitat polygons, or had a lack of requisite species diversity. These areas primarily had prairie coneflower (*Ratibid columnifera*), occasionally a few stems of purple coneflower (*Echinacea angustifolia*) and native thistle (*Cirsium* spp.), along with scattered pockets of big bluestem (*Andropogon gerardii*). There were populations of the noxious weed musk thistle (*Carduus nutans*) throughout these areas. The sites were primarily dominated by smooth brome (*Bromus inermis*). However, regardless of their marginal nature they were verified as suitable habitat due to the existence of some suitable habitat attributes. Figure 2 is an example of one of these areas that had low diversity

Figure 2. Smooth brome-dominated site, with few prairie coneflowers and native thistle, along with small patches of big bluestem.

A few suitable habitat polygons had fairly representative Type A and Type B habitat, as noted by the USFWS (2016, 2018).

The Type A suitable habitat areas contained smooth deathcamas (*Zigadenus elegans*), pale-spike lobelia (*Lobelia spicata*), Canada goldenrod (*Solidago canadensis*), candle anemone (*Anemone cylindrica*), and few prairie lily (*Lilium philadelphicum*), black-eyed Susan (*Rudbeckia hirta*), and big bluestem (Figure 3). The most representative Type A habitat in the survey area was portions of the field-verified habitat located in the NWNW1/4 of Section 18, Township (T) 113 North (N), Range (R) 48 West (W) and the SWSW1/4 of Section 7, T113N, R48W (see maps in Appendix A). These areas were low-lying flats adjacent to wetlands (see Figure 3).

Type B suitable habitat areas had big bluestem and sideoats grama (*Bouteloua curtipendula*), with an abundance of purple prairie clover (*Dalea purpurea*) with scattered purple coneflower and prairie coneflower (Figures 4 and 5). Some of the Type B habitat had other dominant native species, such as porcupinegrass (*Hesperostipa spartea*) and switchgrass (*Panicum virgatum*). The most representative Type B habitat in the survey area was portions of the field-verified habitat located in the NE1/4 of Section 20, R113N, R48W and NW1/4 of Section 21, R113N, R48W (see maps in Appendix A). These areas were in undisturbed grassland with livestock grazing managed to perpetuate a native plant community (see Figure 4).

Figure 3. Low-lying site with smooth deathcamas, pale-spike lobelia, Canada goldenrod, and candle anemone.

Figure 4. Area dominated by big bluestem, porcupinegrass, and switchgrass, with Aster sp., smooth deathcamas, sideoats grama, purple prairie clover, and few purple coneflower.

Figure 5. Purple coneflower, purple prairie clover, big bluestem, and some little bluestem.

Unsuitable habitat areas were primarily dominated by non-native upland species (e.g., smooth brome, clover [*Trifolium* spp.], orchardgrass [*Dactylis glomerata*], or timothy [*Phleum pratense*]), or in a wetland that did not have requisite Dakota skipper or Poweshiek skipperling plant species. Alfalfa (*Medicago sativa*) was prevalent in many of the unsuitable habitat areas. Some relict native grassland areas had a high composition of porcupinegrass and native forbs, but the requisite Dakota skipper or Poweshiek skipperling plant species were not present. Canada thistle (*Cirsium arvense*) and musk thistle populations were located throughout the survey area. Figures 6, 7, and 8 show examples of these unsuitable habitat areas.

Figure 6. Orchardgrass-dominated site.

Figure 7. Smooth brome- and alfalfa-dominated site.

Figure 8. Smooth brome-dominated site with a relict population of porcupinegrass.

Adult protocol surveys were completed in field-verified suitable habitat target areas on June 29 and 30 and July 5, 7, 8, 10, 11, and 12, 2018. The survey dates, the application round, the permitted surveyor leading the surveys, and the weather on those dates are summarized in Table 1. Round 2 surveys on July 7 only surveyed those target areas surveyed on June 29 (first round survey date) to maintain the 48-hour separation of surveys requirement. Round 3 surveys on July 10 only surveyed those target areas surveyed on July 7 (second round survey date) to maintain the 48-hour separation of surveys requirement. Round 3 surveys on July 11 and 12 only surveyed those target areas surveyed on July 8 (second round survey data) to maintain the 48-hour separation of surveys requirement. Mr. Powell and Dr. Lightfoot surveyed using separate teams on July 7. All portions of the target survey areas were covered by the survey teams during each round and there were 48 hours between the surveys of all areas.

Table 1. Survey Rounds

Date	Round	Permitted Surveyor	Weather at Start of Surveys (percent cloudy, degrees Fahrenheit, average miles per hour wind speed)	Weather at End of Surveys (percent cloudy, degrees Fahrenheit, average miles per hour wind speed)
June 29	1	Jake Powell	10, 85, 12	15, 92, 7
June 30	1	Jake Powell	20, 72, 4	30, 75, 3
July 5	1	Jake Powell	20, 78, 5	30, 91, 7
July 7	2	David Lightfoot	90, 86, 19	95, 86, 19
July 8	2	Jake Powell, David Lightfoot	30, 85, 16	10, 87, 15
July 10	3	David Lightfoot	45, 70, 15	60, 88, 15
July 11	3	David Lightfoot	50, 88, 16	25, 91, 15
July 12	3	David Lightfoot	50, 77, 9	40, 78, 9

No Dakota skippers or Poweshiek skipperlings were observed during any of the three rounds of adult protocol surveys. Based on the USFWS (2018) guidelines, the 41.5 acres of suitable habitat where adult protocol surveys were conducted would be considered 'not occupied'.

Summary

This is a summary of the results:

- The desktop review resulted in 3,705.0 acres of potential habitat being identified.
- Habitat surveys were conducted from June 23 through June 28, 2019.
- The habitat surveys field-verified 41.5 acres of suitable habitat for the Dakota skipper and Poweshiek skipperling.
- Three rounds of adult protocol surveys were conducted on the 41.5 acres of suitable habitat from June 29 through July 12, 2018.
- No Dakota skippers or Poweshiek skipperlings were observed during the adult protocol surveys.
- Based on the USFWS (2018) guidelines, the 41.5 acres of suitable habitat where adult protocol surveys were conducted would be considered 'not occupied'.

4 REFERENCES CITED

Rigney, C.L. 2013. Habitat characterization and biology of the threatened Dakota skipper (*Hesperia dacotae*) in Manitoba. Masters of Science. Manitoba, Canada: The University of Winnipeg.

Royer, R., J. Austin, and W. Newton. 1998. *Checklist and "Pollard Walk" Butterfly Survey Methods on Public Lands*. Paper 10. U.S. Geological Survey, Northern Prairie Wildlife Research Center.

Royer, R., and G.M. Marrone. 1992a. *Conservation Status of the Poweshiek Skipper (*Oarisma poweshiek*) in North and South Dakota*. Denver, Colorado: U.S. Fish and Wildlife Service. March 15, 1992.

———. 1992b. *Conservation Status of the Dakota Skipper (*Hesperia dacotae*) in North and South Dakota*. Denver, Colorado: U.S. Fish and Wildlife Service. March 15, 1992.

Selby, G. 2013. *U.S. Fish and Wildlife Service Region 3 2012 Minnesota Prairie Butterfly Surveys, Final Report*. Bloomington, Minnesota: U.S. Fish and Wildlife Service, Twin Cities Field Office. January 31, 2013.

Skadsen, D.R. 2003. *Dakota Skipper Population Surveys for CCAA Development in the State of South Dakota*. Pierre: South Dakota Department of Game, Fish, and Parks Wildlife Division. Report 2003-20. December 31, 2003.

Stantec Consulting Services Inc. (Stantec). 2018. Tatanka Ridge Wind Project Desktop Analysis for Dakota skipper and Poweshiek skipperling habitat. Unpublished data.

U.S. Fish and Wildlife Service (USFWS). 2014. *Poweshiek Skipperling (*Oarisma poweshiek*) Fact Sheet*. USFWS, Midwest Region. October 2014.

———.2016. *Guidance for Interagency Cooperation Under Section 7(a)(2) of the Endangered Species Act for the Dakota Skipper, Dakota Skipper Critical Habitat, and Poweshiek Skipperling Critical Habitat, Version 1.1*. May 2016.

———. 2018. *2018 Dakota Skipper (*Hesperia dacotae*) North Dakota Survey Protocol*. USFWS, Mountain-Prairie Region. Available at: www.fws.gov/midwest/endangered/insects/dask/index.html. Accessed June 18, 2018

Western Ecosytems Technology, Inc. 2018. Tatanka Ridge Wind Project Undisturbed Grassland Geographic Information Systems shapefile. Submitted to SWCA from Buffalo Ridge III on June 1, 2018.

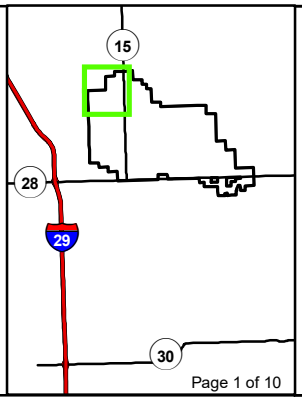
This page intentionally left blank.

APPENDIX A

Results Maps

Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



Page 1 of 10

SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

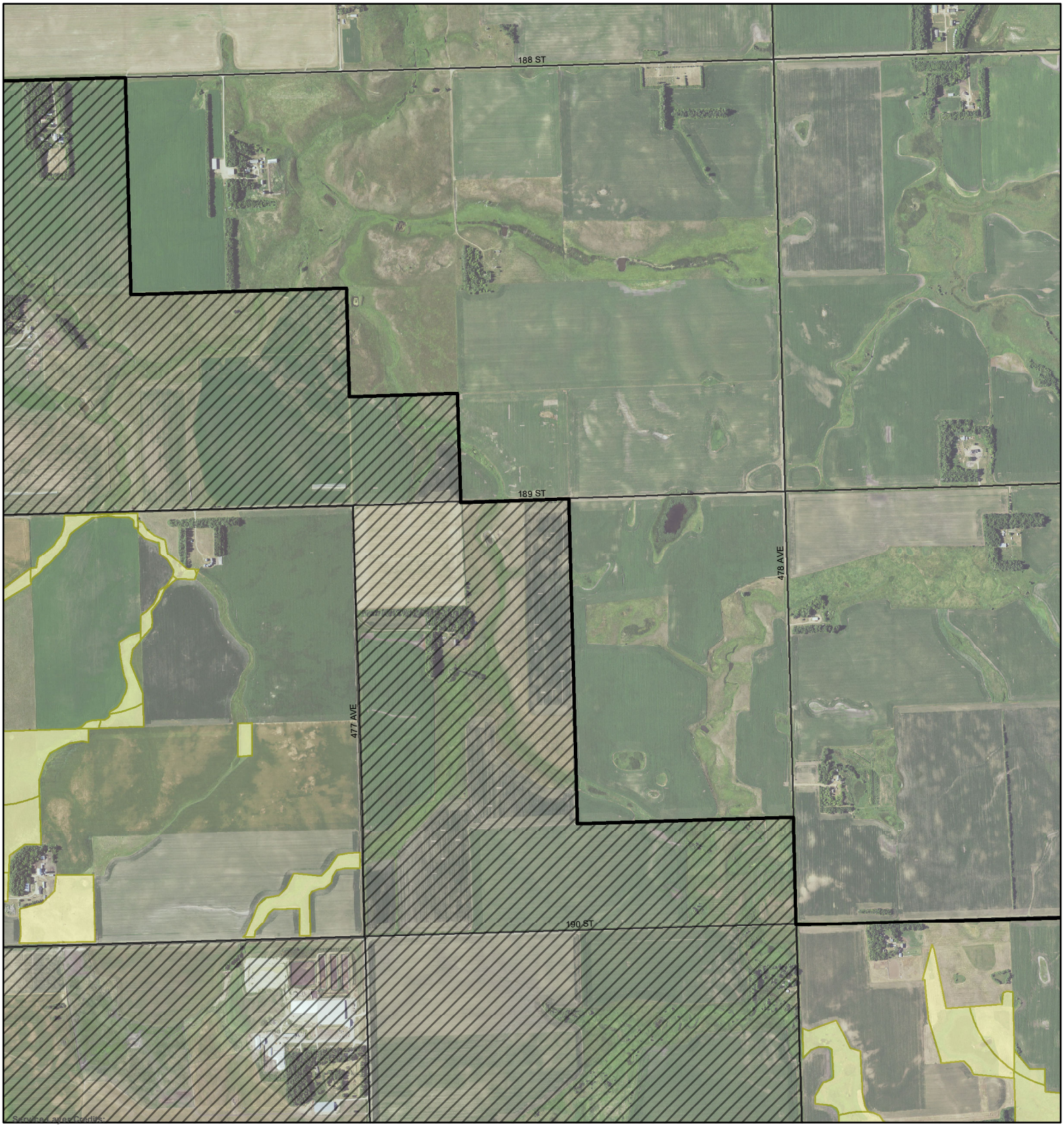
Kilometers
0 0.5 1

Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978)

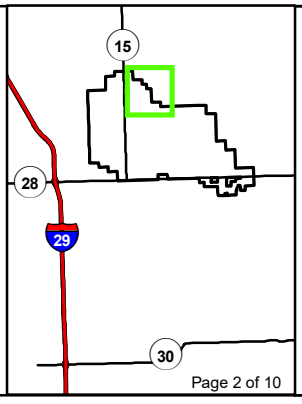
Township/Range: T114N, R49W &
T113N, R49W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N



Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

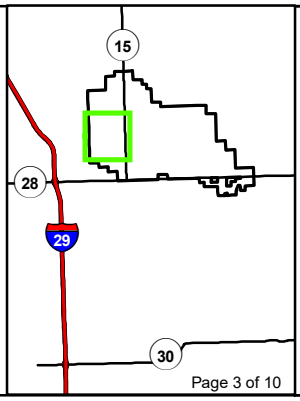
Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978), Toronto (1978)
Township/Range: T114N, R49W & T113N, R49W & T113N, R48W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978), Toronto (1978)
Township/Range: T113N, R49W

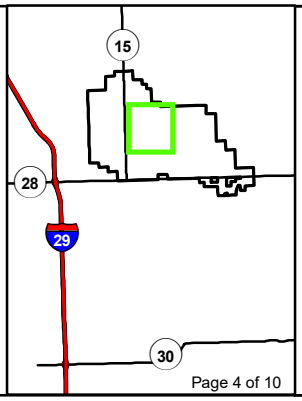
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

N W E S

Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

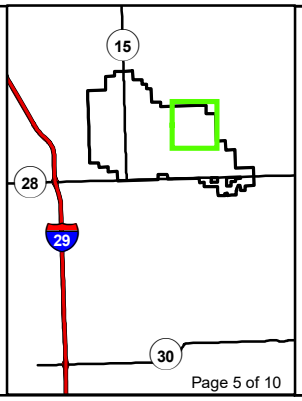
Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978), Toronto (1978)
Township/Range: T114N, R49W & T113N, R49W & T113N, R48W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

Miles
0 0.25 0.5

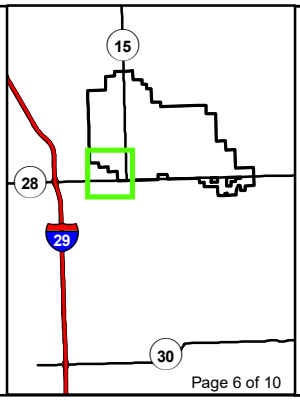
Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Clear Lake South (1978), Toronto (1978), Brandt (1978), Astoria (1978)
Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

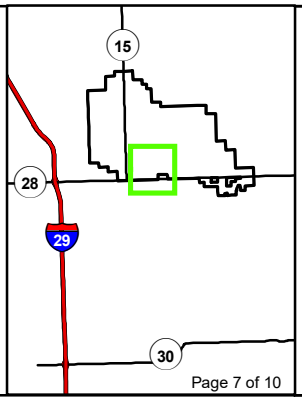
Township/Range: T113N, R49W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

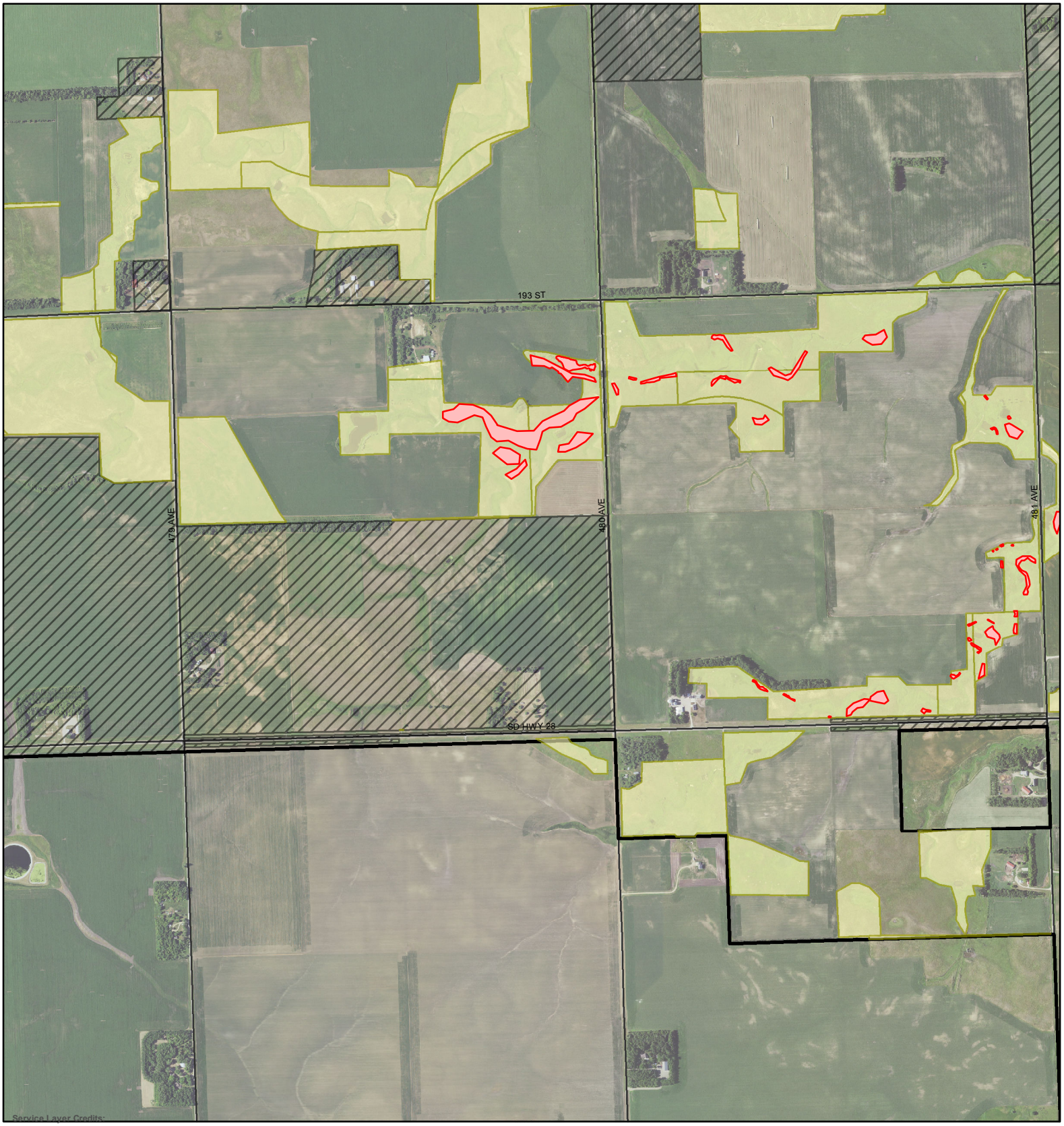
Kilometers
0 0.5 1

Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978)

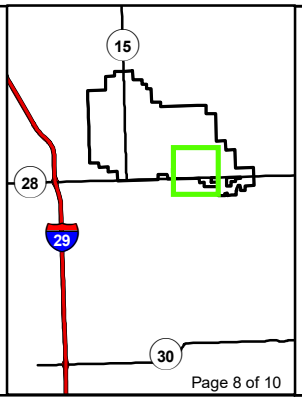
Township/Range: T113N, R49W &
T113N, R48W
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N



Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

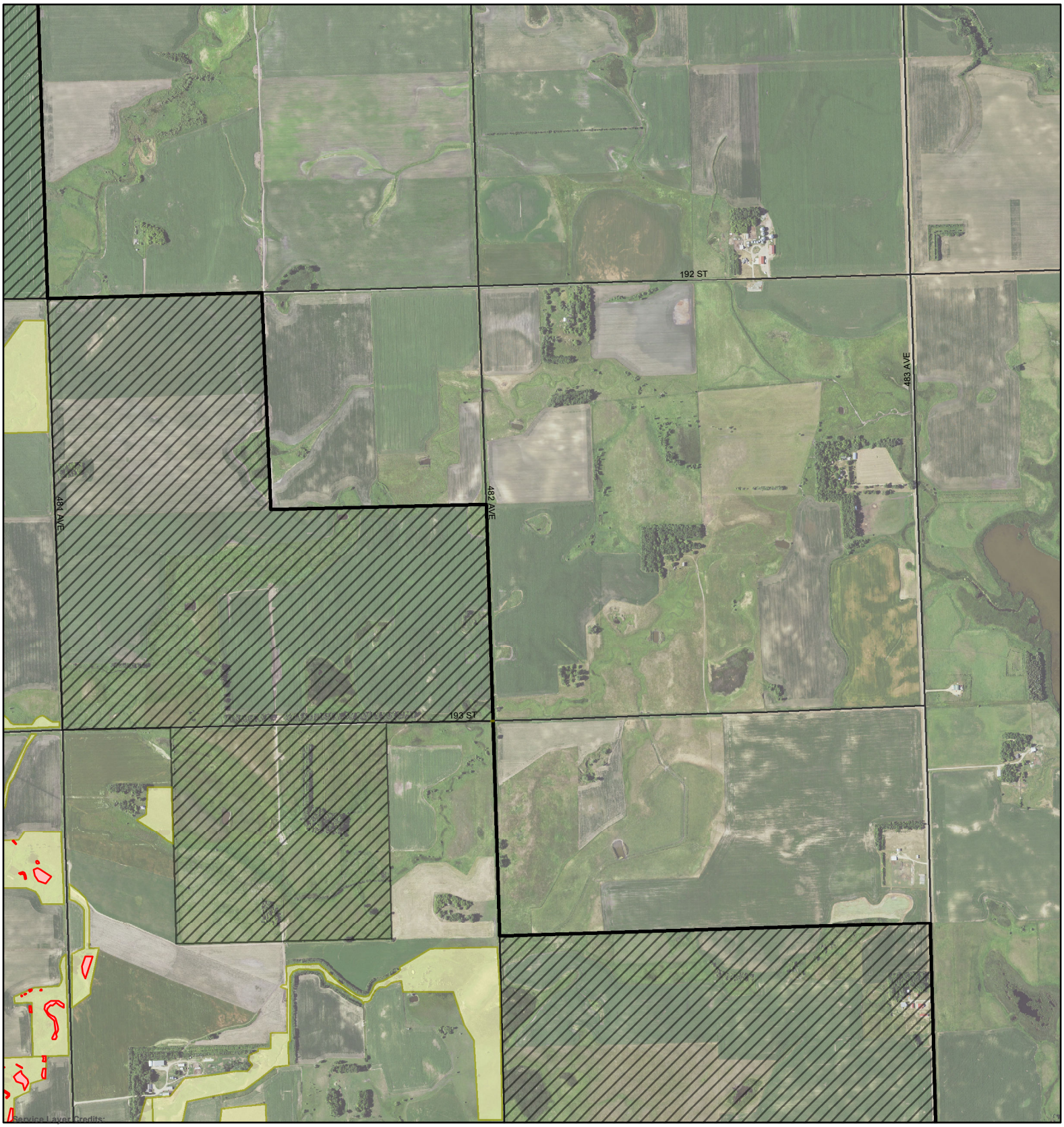
Kilometers
0 0.5 1

Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Toronto (1978),
Astoria (1978)
Township/Range: T113N, R48W

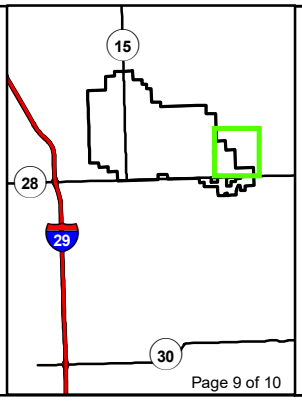
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N



Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

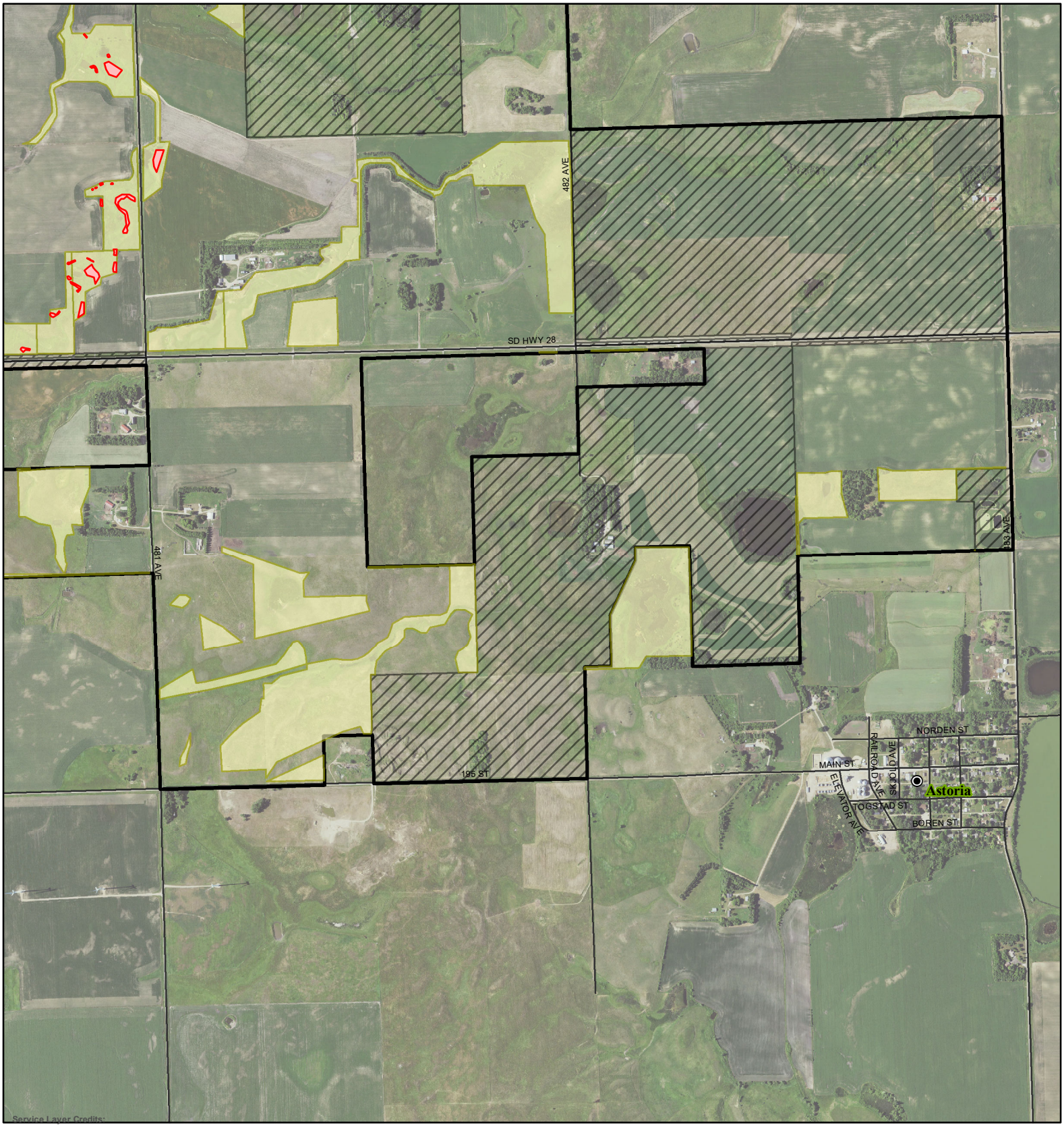
Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Astoria (1978)

Township/Range: T113N, R48W

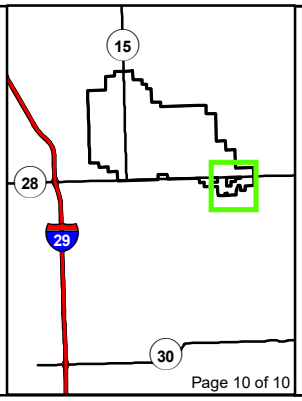
Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N



Tatanka Ridge Wind Project

- City
- Existing Road
- Field-verified Suitable Habitat
- Potential Habitat
- No Landowner Access
- Project Boundary



SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

8/3/2018

Kilometers
0 0.5 1

Miles
0 0.25 0.5

Base Map: 2016 Aerial Imagery
Source: USDA/FSA - Aerial Photography Field Office
Quadrangle: Astoria (1978)

Township/Range: T113N, R48W

Deuel County, South Dakota

Projection: NAD 1983 UTM Zone 14N

APPENDIX B

USFWS Survey Request

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Dakota Ecological Services

420 South Garfield Avenue, Suite 400
Pierre, South Dakota 57501-5408

IN REPLY REFER TO:
TE64070B-1 Skipper
Permit

June 13, 2018

Jake Powell, Senior Ecologist
SWCA Environmental Consultants
1892 South Sheridan Avenue
Sheridan, Wyoming 82801

Dear Mr. Powell:

This letter provides your site specific authorization per condition F.3 of Federal Endangered Species Permit No. TE64070B-1. Under this condition you are to notify the U.S. Fish and Wildlife Service (Service) Field Supervisor for the state in which activities are proposed to occur at least 30 days prior to conducting any activities.

The information required under condition F.3 was provided to the Service in a letter dated June 13, 2018. In summary, SWCA has a contract with Buffalo Ridge III, LLC to complete surveys for Dakota skipper and Poweshiek skipperling in Deuel County, South Dakota, during the 2018 adult flight period. Surveys will be conducted between approximately June 25 and July 15 by Mr. Jake Powell, Dr. Kenneth J. Kingsley, and Dr. David Lightfoot. The survey protocols will follow the 2018 Dakota skipper survey protocols (https://wwww.fws.gov/midwest/endangered/insects/dask/index.html). The surveys will be conducted on field verified suitable habitat.

All survey activities should conform to the conditions of your Service permit TE64070B-1. Please report your data from this survey to the USFWS South Dakota Field Office .

As stated in your permit, your concurrence letter must be carried with this permit to authorize site-specific activities. If you have any questions, please feel free to call Charlene Bessken at 605-224-8693 x 231.

Sincerely,

Scott V. Larson
Field Supervisor
South Dakota Field Office

APPENDIX C

Butterfly County

Butterfly Count per Survey Day		**June 29**	**June 30**	**July 5**	**July 7**	**July 8**	**July 10**	**July 11**	**July 12**
Common Name	***Scentific Name***								
Monarch	*Danaus plexippus*	3	2	9	4	27	9	7	13
Regal Fritillary	*Speyeria idalia*	0	6	18	0	45	1	7	53
Common wood nymph	*Cercyonis pegala nephele*	4	1	12	2	16	5	0	13
Meadow fritillary	*Boloria bellona*	10	15	43	11	27	25	4	36
Painted lady	*Vanessa cardui*	0	0	1	0	0	0	0	0
Black swallowtail	*Papilio polyxenes asterius*	0	0	1	0	0	0	0	0
Pearl Crescent	*Phyciodes tharos*	0	0	4	0	0	3	1	1
Peck's skipper	*Polites peckius*	1	0	3	2	2	3	0	0
Long-dash skipper	*Polites mystic dacotah*	0	0	5	0	0	0	2	0
Tawny-edged skipper	*polites themistocles*	1	0	7	0	1	0	0	0
Clouded sulphur	*Colias philodice*	2	0	0	11	47	13	28	37
Varigated fritillary	*Euptoieta claudia*	0	0	0	0	2	2	4	8
Checkered white	*Pontia protodice*	0	0	0	0	1	1	0	0
Red Admiral	*Vanessa atalanta rubria*	1	0	0	0	3	1	2	0
Melissa blue	*Lycaeides melissa*	0	1	0	0	3	0	4	2
Orange sulphur	*Coias eurytheme*	0	0	0	0	0	0	5	0
Coral hairstreak	*Satyrium titus*	0	1	0	0	0	0	1	0

APPENDIX D

USFWS Flowering Plants Count

Plant Species	Average count
Purple coneflower	1,000-5,000
Milkweed	500-1,000
Vetch	500-1,000
Alfalfa	500-1,000
Thistle	5,000-10,000
Yellow coneflower	5,000-10,000
Prairie violet	0
Goldenrod	500-1,000
Wild rose	100-500
Curlycup gumweed	50-100
Blazing star	1,000-5,000
Penstemon	100-200
Smooth fleabane	50-100
Western wallflower	50-100
Prairie lily	50-100
Purple prairie clover	5,000-10,000
Black-eyed Susan	500-1,000
Scarlet globemallow	500-1,000
Maximilian sunflower	0
Spiderwort	0
Harebell	50-100
Silverleaf scurfpea	500-1,000
Leadplant	1,000-2,000
Wild bergamot	50-100
Rocky Mountain beeplant	0
Blanketflower	0
Dandelion	5,000-10,000

NATIVE ENDANGERED SPECIES RECOVERY
ENDANGERED WILDLIFE

Permit Number: TE64070B-1

Effective: 03/12/2018 Expires: 12/31/2023

Issuing Office:

Department of the Interior
U.S. FISH & WILDLIFE SERVICE
Endangered Species Permit Office
5600 American Boulevard, West, Suite 990
Bloomington, MN 55437-1458
permitsR3ES@fws.gov

Chief - Endangered Species

Permittee:
SWCA, INC
dba SWCA ENVIRONMENTAL CONSULTANTS
116 NORTH 4TH STREET, SUITE 200
BISMARCK, ND 58501
U.S.A.

Name and Title of Principal Officer:
SARAH BAER - DIRECTOR

Authority: Statutes and Regulations: 16 USC 1539(a); 50 CFR 17.22, 50 CFR 13.

Location where authorized activity may be conducted:
Throughout the range of the species in the States of Iowa, Michigan, Minnesota, North Dakota, South Dakota and Wisconsin.

Reporting requirements:
ANNUAL REPORT DUE: 01/31
See permit conditions for reporting requirements

Authorizations and Conditions:

Scientific Recovery Permit number TE64070B-1 replaces Sub-permit no. 17-20 issued on 06/29/2017. Sub-permit 17-20 is invalid as of 3/12/2018.

A. General Conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local, tribal, or other federal law. Necessary state and/or local permits where applicable, must also be acquired and observed; this permit is invalid without such permits.

C. Valid for use by Kenneth J. Kingsley, David Lightfoot, and Jake Powell. Field assistants not named on this

permit may conduct activities pursuant to this permit only under the direct supervision of a named permittee listed below. "On-sight" supervision is defined as having the authorized individual at a distance that would allow this individual to immediately assist a supervised individual, as needed, while they are conducting an authorized activity.

D. ACCEPTANCE OF THIS PERMIT SERVES AS EVIDENCE THAT THE PERMITTEE AND ITS AUTHORIZED AGENTS UNDERSTAND AND AGREE TO ABIDE BY THE TERMS OF THIS PERMIT AND ALL SECTIONS OF TITLE 50 CODE OF FEDERAL REGULATIONS, PARTS 13 AND 17, PERTINENT TO ISSUED PERMITS. SECTION 11 OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED, PROVIDES FOR CIVIL AND CRIMINAL PENALTIES FOR FAILURE TO COMPLY WITH PERMIT CONDITIONS.

E. Permittee is authorized to take (capture, handle, and release) the following species for scientific research (presence/absence surveys, studies to document habitat use, and population monitoring) aimed at recovery of the species:

Dakota skipper (*Hesperia dacotae*)
Poweshiek skipperling (*Oarisma poweshiek*)
Rusty patched bumble bee (*Bombus affinis*)

F. Activities are authorized at the following locations:

F.1. Locations within Region 3 of the USFWS: Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.2. Locations within Region 5 of the USFWS: Maine, Massachusetts, Virginia, and West Virginia, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.3. Locations within Region 6 of the USFWS: North Dakota and South Dakota upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

G. Permittee shall notify and request approval from the USFWS Field Supervisor for the state in which activities are proposed to occur at least fifteen (15) days prior to conducting any activities. Contact information is available at: <https://www.fws.gov/midwest/endangered/permits/index.html> (located under 1. Recovery and Interstate Commerce Permits, For Fish and Wildlife Permit Holders). Your request for this site-specific approval must be in writing and must indicate:

G.1. Species for which proposed activities are being conducted.

G.2. Location of proposed activities, including project site, county, and state.

G.3. A full description of activities (i.e., proposed project, purpose and need, surveys, methods, etc.)

G.4. Dates when the project is proposed to take place.

G.5. Evidence that Permittee has received any required contracts to complete the activities.

G.6. Whether all prior annual reporting requirements have been fulfilled.

G.7. You may proceed with activities only upon receipt of written concurrence from the applicable USFWS Field Supervisor. *Your concurrence letter must be carried with this permit to authorize site-specific activities.*

H. Permittees must adhere to the following conditions for all species:

H.1. Accidental mortality, may not exceed one (1) specimen per species. In the event that this number is met, all species activities for this permit must cease (e.g. One rusty patched bumble is accidentally killed, all activities associated with Rusty patched bumble bee must cease, but activities associated with Dakota skippers and Poweshiek skipperlings may continue.). You must contact the Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.) within two (2) business days and explain the incident and its circumstances. Your initial contact may be made by telephone; however, a written explanation must be provided within five (5) days of the incident to the following USFWS offices: Regional Recovery Permits Coordinator, Bloomington, Minnesota (Condition L.1.), the Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.), and the Field Office for the state in which the activity occurred (Condition M.). Following mortality or injury of a species you may not resume activities, for that species, authorized by this permit without written permission of the U.S. Fish and Wildlife Service, Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.).

H.2. Any individuals found dead or killed accidentally (during authorized activities) may be salvaged. Prior to collecting specimen(s), you must photograph to document the condition. For Dakota skipper and Poweshiek skipperling specimens, also see additional procedures in Condition I.10. You must preserve the specimen(s) using standard museum practices including proper identification and indices [include date, complete scientific and common names, and geographic location (township, range, section, and UTM) where salvaged]. All specimens obtained under this permit remain the property of the United States Government and must clearly be identified as such. All specimens shall be sent to a public scientific or educational facility or museum in the state where the individuals were collected along with a copy of the permit(s) under which they were collected. When agreed upon in writing by the Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.), specimens may be sent out of state to an alternate specialized educational facility or museum within the United States. A list of specimens collected (if any), pertinent location data, and the facility where specimen is curated shall be provided in your annual and final reports (Conditions K.1.e and K.2.g.)

H.3. Upon any new discovery location, permittee shall notify the U.S. Fish and Wildlife Service Field Supervisors (Condition M.) and the Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.) in writing of where the new discovery location occurred (previously undocumented sites only) within

fourteen (14) days of discovery unless otherwise specified by the Field Supervisor(s).

I. In addition to Condition H. permittees must adhere to the following conditions for Dakota skipper and Poweshiek skipperling:

I.1. To the extent practicable, identification of Dakota skippers and Poweshiek skipperlings shall be done in a manner that avoids capture.

I.2. Any specimens that must be captured for identification shall be handled in a manner that minimizes the likelihood of injury.

I.3. If it is necessary to capture specimens to facilitate identification, you may capture them in a soft butterfly net. All reasonable efforts must be made to allow the butterfly to walk freely inside the net and to avoid direct contact with the butterfly. This may be done, for example, by holding the net upside down and holding the bottom of the net upwards to allow the butterfly to walk up into the net - a pouch may be created in the upside-down net to facilitate close inspection by pinching the net below the butterfly while ensuring its free movement inside the net.

I.4. Captured butterflies may also be placed inside plastic jars by carefully coaxing them from the net into the jar. The jar must contain some type of tissue (preferred), paper towel, or soft cloth that the butterfly may stand or walk on while in the jar to facilitate visual inspection.

I.5. Any captured Dakota skippers or Poweshiek skipperlings shall be released as near to the capture site as possible and as soon as is practicable. Temporary holding of specimens for the purpose of species identification shall not exceed 5 minutes.

I.6. No mutilation (e.g., leg removal) or marking schemes are authorized.

I.7. Handling affects the behavior of some butterflies after their release. Permittee shall observe post-release behavior of any Dakota skippers or Poweshiek skipperlings that are captured and released. The behavior of each captured and released butterfly will be noted and reported annually as described in Condition K.1.c.

I.8. Collection of voucher specimens of Dakota skipper: This may occur only when the species is encountered in a county where it has not been previously recorded. A list of counties where the Dakota skipper has been documented can be found online at <https://www.fws.gov/midwest/endangered/insects/dask/pdf/CntyOccurrencesDASKNov2017.pdf> . In new counties, only one voucher specimen is permitted and collection of a female is discouraged if a male could be vouchered instead. In addition, dead or dying specimens (from natural causes) may be collected for voucher specimens regardless of geographic area, adhering to Conditon H.2. Upon approval and review by the Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.), any individuals accidentally killed or lethally injured may also be collected as voucher specimens. The number, location, cause of death (if known), sex, and any other information relevant to voucher specimen must be reported in the annual report as described in Condition K.1.d.

I.9. The collection of voucher specimens of Powesheik skipperlings is strictly prohibited except for circumstances identified in Condition H.2.

I.10. If collection of a voucher specimen of Dakota skipper (Conditions H.2. and I.9.) and/or Powesheik skipperling (Condition H.2.) occurs, please adhere to the following protocol: For each vouchered specimen, clip two legs and place in a 30mL or smaller vial filled with 95-100% ethanol (EtOH; not isopropyl alcohol). The remainder of the specimen shall be preserved according to the conditions noted in H.2., making note on the identification tag that two legs were removed and sent to the Minnesota/Wisconsin Field Office. The vial with legs should also have all proper identification and indices [include date collected, complete scientific and common names, and geographic location (township, range, section, and UTM) where salvaged, and a note identifying the specimen as property of the United States Government]. Double bag the vial and ship in a strong outer container with enough absorbent material to soak up any ethanol that might accidentally leak. Include a copy of permit(s) under which the sample(s) was collected when shipping vials. Label the outer shipping box "Samples. This package conforms to 49 CFR 173.4" Ship this package to the Minnesota/Wisconsin Field Office as soon as possible.

J. In addition to Condition H. permittees must adhere to the following conditions for rusty patched bumble bee:

J.1. Rusty patched bumble bees may be captured with aerial hand nets following the methodology, guidelines, and best practices included in the "Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*)" (Survey Protocols). Survey Protocols are available online at: <https://www.fws.gov/midwest/endangered/insects/rpbb/guidance/>. Note that you must use the most up-to-date version of the Survey Protocol, available on the USFWS website page on February 28th of each year.

J.2. For areas believed to be unoccupied by rusty patched bumble bee (See map online at: <https://www.fws.gov/midwest/endangered/insects/rpbb/guidance/>), you are authorized to take (capture, release, and accidental mortality) only in the event that the species is captured accidental to lawful survey activities directed at other species (if using lethal survey methods such as bee bowl, pan, or cup traps, malaise traps, or blue vane traps). This permit does not authorize any activities for the specific purpose of lethal capture of rusty patched bumble bee. If rusty patched bumble bees are identified at a survey site, all lethal survey methods shall cease within a two (2) mile area and permittee shall contact the U.S. Fish and Wildlife Service in accordance with Condition H.1. Should accidental mortality occur you must document the capture and collect information outlined in Condition K.2.f. on the captured individual.

J.3. For a permittee using approved, lethal protocols in areas where the lethal protocols are allowed (Condition J.2.), all rusty patched bumble bees need to be identified from samples annually, in time to be included in the annual report due January 31. In some cases, accidental mortality may not be discovered until specimens are identified by a bee taxonomist. In these cases the permit holder and/or taxonomists must take an initial look through samples to identify rusty patch bumble bees in order to include this information in the annual report. In the event that one or more rusty patched bumblebees are identified in a sample, all lethal survey activities must cease within two (2) miles of the capture location. The Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.) must be contacted within two (2) business days of discovery of the specimen and the circumstances of collection. Initial contact may be made by telephone, however, a written explanation must be provided within five (5) days of the identification to the following USFWS offices: Regional Recovery Permits Coordinator, Bloomington, Minnesota (Condition L.1.), the Minnesota/Wisconsin Ecological Services Field Office (Condition L.2.), the Field Office for the state in which the activity occurred (Condition M.).

J.4. The collection of a voucher specimen of Rusty patched bumble bee is strictly prohibited except for circumstances identified in Condition H.2.

K. An annual report of all activities conducted under the authority of this permit is due by January 31 following each year this permit is in effect. In addition, copies of all publications and reports resulting from work conducted under this permit must be submitted as they become available. Failure to furnish any reports required by this permit is cause for permit revocation and/or denial of future permit applications.

K.1. Reporting requirements for Dakota Skipper and Poweshiek skipperling:

K.1.a A complete discussion of field procedures, data collection methods, results, and conclusions.

K.1.b. The date and location (state, county, locality, geographic coordinates, site characteristics) where each species was encountered.

K.1.c. A complete discussion of post-capture behavior, including, at a minimum, whether the specimen:

K.1.c.1. Flew to and perched on herbaceous vegetation, low shrubs, or to out-of-sight location in herbaceous vegetation (e.g., into plant litter or duff layer or into bases of grasses).

K.1.c.2. Flew into tall shrubs or trees and out-of-sight.

K.1.c.3. Flew away - did not see butterfly perch or fly into vegetation; or,

K.1.c.4. Post-release behavior unknown.

K.1.d. A complete description of injuries and/or mortalities to listed species while in your possession, the dates of occurrence, location, cause of death (if known), any circumstances surrounding the incidents, sex, numeric estimates of the mortalities broken down by lifestage (e .g., eggs, larvae, pupae, adults), and a description of any steps taken to reduce the likelihood that such injuries and/or mortalities will occur in the future.

K.1.e. Any other data you may have collected for individual butterflies, such as evidence of damage or injury, mortalities, locations where salvaged specimens are being kept.

K.1.f. Copies of any separate reports and/or publications resulting from work conducted under the authority of this permit.

K.1.g. Copies of all site specific authorization letters required under Condition G.

K.2. Reporting requirements for rusty patched bumble bee:

K.2.a. A description of locations (date, time, geographic locations (state, county, and geographic

coordinates using latitude and longitude in decimal degrees)) of areas surveyed, even if no rusty patched bumble bees were encountered.

K.2.b. The date, time, geographic locations (state, county, and geographic coordinates using latitude and longitude in decimal degrees) of any rusty patched bumble bees encountered. While not required, we appreciate receiving information for other *Bombus* species captured, as this information could help indicate suitable habitat for rusty patched bumble bee.

K.2.c. A description of the habitat conditions where the surveys took place (e.g., floral diversity and abundance, management practices and potential stressors).

K.2.d. A description of field procedures, data collection methods, and survey effort.

K.2.e. Photographs of the identifying characteristics for each individual federally-listed species. Photographs of other *Bombus* species observed are encouraged.

K.2.f. A complete description of injuries or mortalities to listed species while in your possession, the dates of occurrence, location of occurrence, any circumstances surrounding the incidents, and a description of any steps taken to reduce the likelihood that such injuries and/or mortalities will occur in the future.

K.2.g. Any other data you may have collected for individual rusty patched bumble bees, such as evidence of damage or injury, mortalities, locations where salvaged specimens are being kept.

K.2.h. Copies of any separate reports and/or publications resulting from work conducted under the authority of this permit.

K.2.i. Copies of all site specific authorization letters required under Condition G.

If no activities occurred over the course of the year, indication of such shall be submitted as an annual report.

L. Copies of your reports shall be sent to the offices listed below. When possible, electronic copies shall be submitted in lieu of hard copies in MS Word, Portable Document Format, Rich Text Format, or other file format that is compatible with the receiving office.

L.1. Regional Recovery Permits Coordinator

U.S. Fish and Wildlife Service - Midwest Region (Region 3)

Ecological Services - Endangered Species

5600 American Blvd. W., Suite 990

Bloomington, Minnesota 55437-1458

(612/713-5343; fax 612/713-5292)

permitsR3ES@fws.gov

L.2. Minnesota/Wisconsin Ecological Services Field Office

U.S. Fish and Wildlife Service - Midwest Region (Region 3)

Ecological Services - Endangered Species

4101 American Blvd. E.

Bloomington, MN 55425

(952/252-0052; fax 952/646-2873)

L.3. Regional Recovery Permits Coordinator

U.S. Fish and Wildlife Service - Northeast Region (Region 5)

Ecological Services - Endangered Species

300 Westgate Center Drive

Hadley, Massachusetts 01035-9589

(703/358-2402; fax 413/253-8482)

permitsR5ES@fws.gov

L.4. Regional Recovery Permits Coordinator

U.S. Fish and Wildlife Service - Mountain Prairie Region (Region 6)

Ecological Services - Endangered Species

P.O. Box 25486, DFC, MS 60120

Denver, Colorado 80225

(719/628-2670)

permitsR6ES@fws.gov

M. Additionally, based on geographic area where surveys were conducted, reports and publications shall be submitted to the offices listed under Field Office Contact Information at: <https://www.fws.gov/midwest/endangered/permits/index.html>.

All correspondence related to this permit should reference the permit number shown above. Any questions you may have regarding this permit should be directed to Carlita Payne, the Region 3 Endangered Species Permits Coordinator at (612) 713-5339.

cc: FWS/Region 5 and 6 (Attn: Regional Recovery Permits Coordinator)
FWS/ES/ Endangered Species Coordinators IA-IL, IN, MI, MN-WI, OH
DNR, Endangered Species Coordinators IA, IL, MI, MN, OH, IN, WI

Appendix E

Protected Species Agency Documentation

IPaC resource list

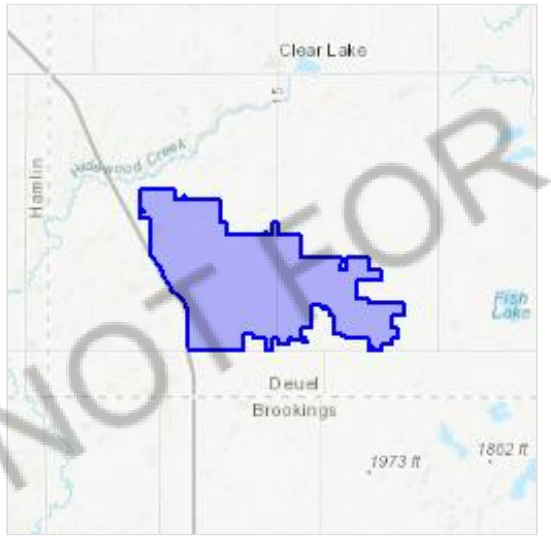
This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Deuel County, South Dakota



Local office

South Dakota Ecological Services Field Office

(605) 224-8693
(605) 224-9974

420 South Garfield Avenue, Suite 400
Pierre, SD 57501-5408

http://www.fws.gov/southdakotafieldoffice/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NOT FOR CONSULTATION

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Red Knot Calidris canutus rufa No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1864	Threatened

Fishes

NAME	STATUS
Topeka Shiner Notropis topeka (=tristis) There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4122	Endangered

Insects

NAME	STATUS
Dakota Skipper Hesperia dacotae There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened
Poweshiek Skipperling Oarisma poweshiek There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/9161	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

NOT FOR CONSULTATION

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NOT FOR CONSULTATION

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES

	THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

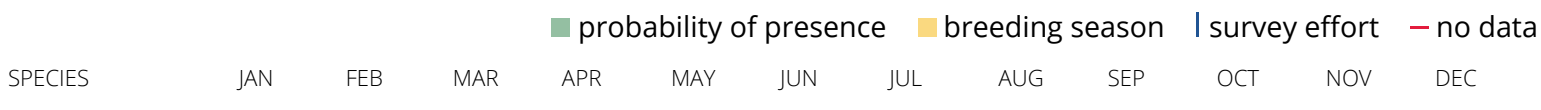
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

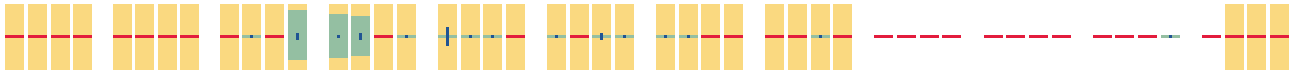
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION

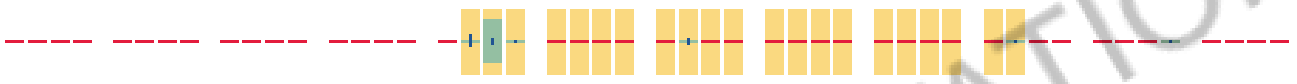


Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

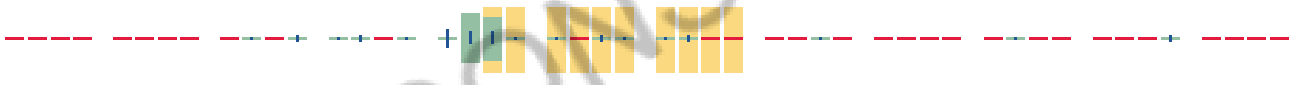


Black Tern
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

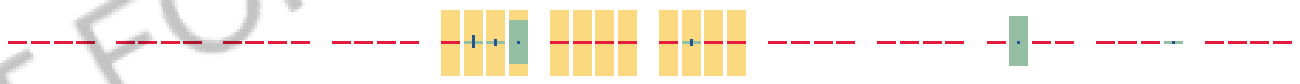
Black-billed Cuckoo
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



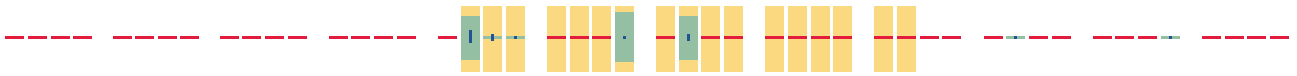
Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Franklin's Gull
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Red-headed Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Ruddy Turnstone
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and

NOT FOR CONSULTATION

3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

NOT FOR CONSULTATION

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
Madison Wetland Management District	0 acres

(605) 256-2974
(605) 256-9432

MAILING ADDRESS
P.O. Box 48
Madison, SD 57042-0048

PHYSICAL ADDRESS
23520 Sd Highway 19
Madison, SD 57042-0048

https://www.fws.gov/refuges/profiles/index.cfm?id=64560

NOT FOR CONSULTATION

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1A
- PEM1Ad
- PEM1/ABF
- PEM1Cd
- PEM1Cx
- PEM1/ABFd
- PEM1/FOC
- PEM1/ABFx

FRESHWATER FORESTED/SHRUB WETLAND

- PFOC
- PFOA
- PSSA

FRESHWATER POND

- PABFx
- PABFh

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in

NOT FOR CONSULTATION

activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Janelle Rieland <jrieland@west-inc.com>

RE: Natural Heritage Program Data Request

1 message

Heimerl, Casey <Casey.Heimerl@state.sd.us> Tue, May 14, 2019 at 9:56 AM
To: Janelle Rieland <jrieland@west-inc.com>
Cc: "Meyer, Hilary" <Hilary.Meyer@state.sd.us>, "Kempema, Silka" <Silka.Kempema@state.sd.us>

Good morning Janelle,

Attached is a shapefile of documented records from the SD Natural Heritage Database (SDNHD) that occurred within 2 miles of the Tatanka Ridge Wind project areas. There were also additional records of Topeka Shiners (Federally Endangered) and Northern Redbelly Dace (State Threatened) that had not yet been entered into the Heritage Database but I included these as separate shapefiles.

Also included is a description of the main fields in the Natural Heritage Database attribute table and an invoice for your request.

Please note that the SDGFP does not conduct annual surveys for rare species and communities and the absence of data in your project area does not preclude its presence.

If you have any questions please feel free to contact me.

~Casey

From: Janelle Rieland [mailto:jrieland@west-inc.com]
Sent: Friday, May 10, 2019 11:39 AM
To: Heimerl, Casey
Subject: Re: [EXT] Natural Heritage Program Data Request

Good morning Casey,

Thanks for the quick response. Attached, please find the signed Data Use Agreement a kmz, and a shapefile of the Project boundary. Thanks again and have a great weekend!

Janelle

On Fri, May 10, 2019 at 10:56 AM Heimerl, Casey <Casey.Heimerl@state.sd.us> wrote:

Good morning Janelle,

I received your request for Natural Heritage Data. Please email me a shapefile of your requested search area when you have a chance. As a reminder, we do charge for data requests and I can provide you with a cost estimate once I know the search area if needed. I will also need you to read over and sign the attached data use agreement form.

Thanks!

~Casey

Casey Heimerl |*Wildlife Biologist*

South Dakota Game, Fish and Parksfobf

523 East Capitol Avenue | Pierre, SD 57501

605.773.4345 | Casey.Heimerl@state.sd.us

From: info@gfp.sd.us [mailto:info@gfp.sd.us]
Sent: Thursday, May 09, 2019 8:24 AM
To: jrieland@west-inc.com
Cc: Heimerl, Casey
Subject: Natural Heritage Program Data Request

South Dakota - Game, Fish, and Parks

Natural Heritage Program Data Request

A new form was just submitted from the http://gfp.sd.gov/ website with the following information:

ID:	31
Agency/Org/Business:	Western EcoSystems Technology, Inc.
Name:	Janelle Rieland
Address:	7575 Golden Valley Rd, Suite 300 Golden Valley, MN 55427

Email:	jrieland@west-inc.com
Phone:	612-310-8012
Fax:	
URL:	
Element or Subject:	Looking to obtain records of known federally and state-listed species and other environmentally sensitive resources located within two miles of a proposed project site.
Type of Data:	Shape files, location, and species information
Purpose of Request:	Site evaluation

--

Janelle Rieland

Project Manager

Western EcoSystems Technology, Inc.
Environmental & Statistical Consultants

7575 Golden Valley Road, Suite 300

Golden Valley, MN 55427

612-310-8012
jrieland@west-inc.com

www.west-inc.com

Follow WEST: Facebook, Twitter, Linked In, Join our Mailing list

CONFIDENTIALITY NOTICE: This message and any accompanying communications are covered by the Electronic Communications Privacy Act, 18 U.S.C. §§ 2510-2521, and contain information that is privileged, confidential or otherwise protected from disclosure. If you are not the intended recipient or an agent responsible for delivering the communication to the intended recipient, you are hereby notified that you have received this communication in error. Dissemination, distribution or copying of this e-mail or the information herein by anyone other than the intended recipient, or an employee or agent responsible for delivering the message to the intended recipient, is prohibited. If you have received this communication in error, please notify us immediately by e-mail and delete the original message. Thank you.

Please consider the environment before printing.

4 attachments

TatankaRidge_SDNHD_5-14-19.zip
9K

TatankaRidge_ExtraFishrecords_5-14-2019.zip
7K

Invoice SDNHP-5-14-19-01.pdf
45K

EOdatafields.pdf
77K

Appendix F

Avian Use Report

Avian Use Study Report for the
Tatanka Ridge Wind Project
Deuel County, South Dakota

April 20, 2018 – March 26, 2019

Prepared for:

Tatanka Ridge Wind, LLC

1125 North West Couch Street, Suite 700
Portland, Oregon 97209

Prepared by:

Lindsey Dernovsek, Janelle Rieland, and John Lombardi

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, Minnesota 55427

June 14, 2019

WEST Inc.

EXECUTIVE SUMMARY

Tatanka Ridge Wind, LLC (Tatanka Ridge), a subsidiary of Avangrid Renewables, LLC has proposed development of the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. Tatanka Ridge Wind contracted Western EcoSystems Technology, Inc. (WEST) to conduct baseline avian studies at the Project to estimate levels of use by avian species and document seasonal and spatial trends in avian use data for evaluating potential impacts from the proposed wind-energy facility.

The study was designed to address the questions posed under Tier 3 of the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* and Stage 2 of the *Eagle Conservation Plan Guidance*. This document provides the results of fixed-point avian use surveys (including large bird surveys, small bird surveys, and incidental observations) conducted from April 20, 2018 to March 26, 2019.

Land cover within the approximately 22,905-acre 2018–2019 Project boundary was predominately cultivated cropland (65.1%) and herbaceous vegetation (24.3%). Wooded habitat was scarce in the Project area, and trees were generally adjacent to creeks and in tree rows associated with rural homesteads and farms.

Fixed-point avian use surveys estimated the seasonal, spatial, and temporal use patterns of avian species within the study area. For 10 months, fixed-point avian use surveys were conducted at 14 points located within the 2018–2019 Project boundary; this increased to 21 points for the final two months of the study due to a change in the Project boundary in early 2019. Small bird surveys preceded the large bird surveys and were conducted for 10 minutes (min) within a 100-meter (m) radius. Large bird surveys were conducted for 60 min within 800-m radius survey plots.

One hundred seventy-eight surveys were conducted in 12 visits. Thirty-seven large bird species were identified, with 8,424 large bird observations recorded within 470 separate groups. Waterfowl accounted for 83.6% of all large bird observations. Thirty-four small bird species were identified, with 1,248 bird observations recorded within 455 separate groups. Passerines accounted for 99.6% of all small bird observations. Overall, avian use was higher during migration periods than other seasons, likely due to the Project's location in the Central Flyway.

Waterfowl were the most abundant large bird type observed at the Project. Spring observations of snow goose accounted for 89.6% of all waterfowl observations. Diurnal raptor use was highest during the fall (1.19 observations/800-m plot/60-min survey) with noticeably lower use in spring, summer, and winter (0.32, 0.29, and 0.03, respectively). The most common raptor observed during surveys was red-tailed hawk (41 of the 78 total raptor observations). Just two bald eagles and two golden eagles were documented during the 178 hours of surveys at the Project and no eagles of either species were recorded incidentally (outside of timed surveys). The raptor species with the highest exposure index was the red-tailed hawk, which ranked 8th highest of all avian

species with exposure indices at the Project. Diurnal raptor use was fairly even across the Project area. Passerines were the most abundant small bird type observed at the Project.

No species listed as threatened or endangered at the state or federal level were documented during surveys. However, nine sensitive species were observed within the Project: bald eagle and golden eagle (protected by the Bald and Golden Eagle Protection Act); American white pelican and trumpeter swan (designated as species of greatest conservation need in South Dakota); and upland sandpiper, grasshopper sparrow, red-headed woodpecker, dickcissel, and Swainson's hawk (designated as Birds of Conservation Concern by the USFWS).

STUDY PARTICIPANTS

Janelle Rieland	Project Manager
Carmen Boyd	Project Tracking & Data Manager
Lindsey Dernovsek	Report Writer & Wildlife Biologist
Julia Preston-Fulton	Technical Editor
Karl Kosciuch	Senior Reviewer
John Lombardi	Lead Client Analyst
Zoey Gustafson	Analyst
Martin Viereckl	GIS Technician

REPORT REFERENCE

Dernovsek, L., J. Rieland and J. Lombardi, 2019. Avian Use Study Report for the Tatanka Ridge Wind Project, Deuel County, South Dakota. April 20, 2018 − March 26, 2019. Prepared for Tatanka Ridge Wind, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. June 14, 2019.

TABLE OF CONTENTS

INTRODUCTION 1
STUDY AREA 1
METHODS 4
Fixed-point Large Bird and Eagle Use Surveys 4
Survey Plots 4
Survey Methods 5
Observation Schedule 5
Fixed-point Small Bird Use Surveys 6
Incidental Observations 6
Statistical Analysis 8
Quality Assurance and Quality Control 8
Data Compilation and Storage 8
RESULTS 10
Fixed-Point Large Bird Use Surveys 10
Avian Diversity and Species Richness 10
Avian Use, Percent of Use, and Frequency of Occurrence 11
Avian Flight Height Characteristics and Behavior 14
Exposure Index 16
Spatial Use 16
Fixed-point Small Bird Use Surveys 24
Small Bird Diversity and Species Richness 24
Avian Use, Percent of Use, Frequency of Occurrence, and Spatial Use 24
Eagle Use 27
Eagle Use by Season 27
Monthly Trends – Eagle Observations and Minutes 28
Spatial Patterns 28
Sensitive Species Observations 32
Incidental Observations 33
DISCUSSION 33
Risk Analysis 34
REFERENCES 35

LIST OF TABLES

Table 1. Land cover types, coverage, and composition within the Tatanka Ridge Wind Project, Deuel County, South Dakota. 4

Table 2. Summary of large bird diversity and species richness, and sample size by season and overall during fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. 11

Table 3. Mean large bird use, percent of total use, and frequency of occurrence for each large bird type by season during the 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. 13

Table 4. Group and individual observation flight height characteristics by large bird type and raptor subtype during fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.....15

Table 5. Relative exposure index and flight characteristics for large bird species during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. 15

Table 6. Summary of small bird diversity and species richness, and sample size by season and overall during the fixed-point small bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. 24

Table 7. Mean small bird use, percent of total use, and frequency of occurrence for each small bird type by season during the 10-minute fixed-point small bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019 25

Table 8. Bald and golden eagle risk minutes, mean use, and risk minutes per hour of survey, documented by season during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.....27

Table 9. Total number of bald and golden eagle observations and total number of eagle risk minutes by month recorded during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.....28

Table 10. Survey effort, eagle observations, and mean eagle use by point at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019. 31

Table 11. Summary of group and individual observations of sensitive species observed at the Tatanka Ridge Wind Project during the fixed-point count avian use surveys and as incidental wildlife observations from April 20, 2018 − March 26, 2019. 32

Table 12. Avian species observed incidentally at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.....33

LIST OF FIGURES

Figure 1. Location of the Tatanka Ridge Wind Project, Deuel County, South Dakota. 2
Figure 2. Land cover at the Tatanka Ridge Wind Project, Deuel County, South Dakota. 3
Figure 3. Survey locations for fixed-point avian use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota 7
Figure 4a. Large bird use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. 17
Figure 4b. Waterfowl use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. 18
Figure 4c. Diurnal Raptor use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. 19
Figure 4d. Gull/Tern use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019 20
Figure 5a. Flight paths for diurnal raptors by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019 21
Figure 5b. Flight paths for waterfowl by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019 22
Figure 5c. Flight paths for gulls/terns by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019 23
Figure 6. Small bird use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point small bird surveys from April 20, 2018 – March 26, 2019 26
Figure 7. Eagle use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. 29
Figure 8. Flight paths for eagles by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019 30

LIST OF APPENDICES

Appendix A. All Bird Types and Species Observed at the Tatanka Ridge Wind Project during Fixed-Point Avian Use Surveys from April 20, 2018 to March 26, 2019.

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Tatanka Ridge Wind Project from April 20, 2018 to March 26, 2019.

Appendix C. Species Exposure Indices for Large Birds during Fixed-Point Avian Use Surveys at theTatanka Ridge Wind Project from April 20, 2018 to March 26, 2019.

Appendix D. Spatial Use by Point during Fixed-Point Avian Use Surveys at the Tatanka Ridge Wind Project from April 20, 2018 to March 26, 2019.

Appendix E: Midwestern Cumulative Fatalities Summary Table

NOTES ON UNITS

Empirical units are used throughout this document, with the exception of the use of meters when describing avian use survey methodology, where metric units are used to be consistent with guidelines. Conversions are provided below.

Empirical	Metric
Unit Conversions	
1 foot	0.30 meter
3.28 feet	1 meter
1 mile	1.61 kilometers
0.621 mile	1 kilometer
1 acre	0.40 hectare
2.47 acres	1 hectare
Common Conversions	
0.06 mile	100 meters
0.12 mile	200 meters
0.5 mile	800 meters
10 miles	16.1 kilometers

INTRODUCTION

In 2018, Tatanka Ridge Wind, LLC, a subsidiary of Avangrid Renewables, LLC contracted Western EcoSystems Technology, Inc., (WEST) to conduct avian use surveys at the Tatanka Ridge Wind Project (Project) to estimate the potential impacts of wind energy facility construction and operations on avian species. The Project will have a nameplate capacity of up to 155 megawatts.

This study was designed to address questions posed under Tier 3 of the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (USFWS 2012). The principal objectives of the study were to: 1) provide site-specific avian resource and use data essential to evaluating potential impacts from the proposed wind energy facility, 2) provide information that could be used for project planning and design of the facility to minimize impacts to avian species, and 3) collect data on eagle use in the area following the USFWS *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013).

This document provides results of fixed-point large bird and fixed-point small bird use surveys, as well as incidental observations recorded at the Project from April 20, 2018 through March 26, 2019.

STUDY AREA

The Project is located in Deuel County, South Dakota. The Project is approximately six miles west of the South Dakota/Minnesota border, near the town of Toronto (Figure 1). The Project boundary utilized for the majority of this study (10 months) reflects the 2018 Project boundary prior to modification in early 2019, at which time the project expanded and shifted westward. Both the 2018 and 2019 Project boundaries are depicted on Figure 1.

The Project falls within the Northern Glaciated Plains Ecoregion, which covers much of the eastern portion of South Dakota (USEPA 2016). Flat to gently rolling landscape composed of glacial drift characterizes the Northern Glaciated Plains. This ecoregion serves as a transitional zone between tall and shortgrass prairie with high concentrations of temporary and seasonal wetlands that are favorable for duck nesting and migration.

Approximately 65.1% of the 22,905-acre 2018–2019 Project boundary area consisted of cropland (Figure 2, Table 1). The next most common land cover types were herbaceous (24.3%), developed areas (e.g., farmsteads and roads; 4.6%), and hay/pasture (3.9%). All other land cover types collectively accounted for less than 3.0% of the Project area (Table 1). The current (2019–2020) Project boundary encompasses similar land cover types.

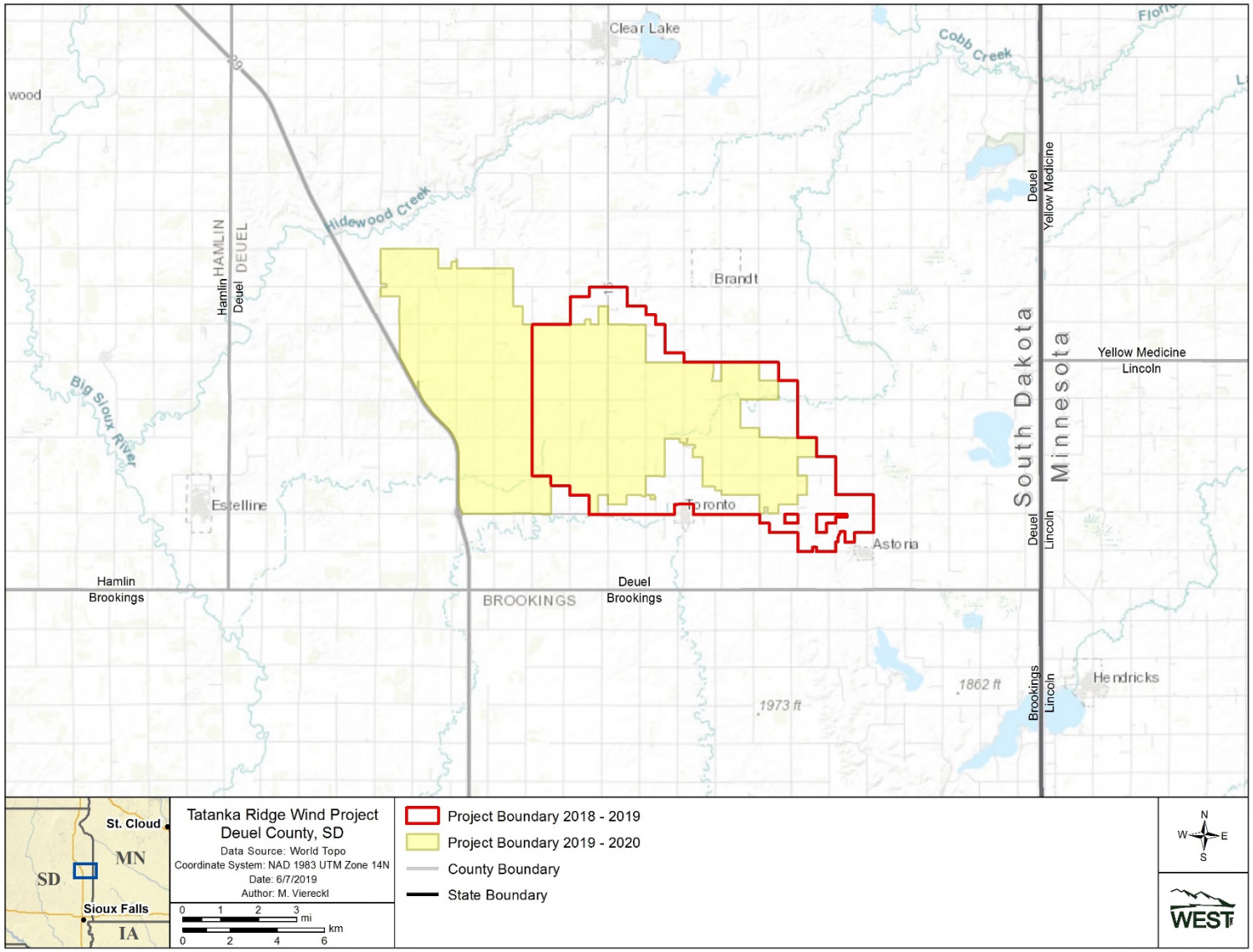


Figure 1. Location of the Tatanka Ridge Wind Project, Deuel County, South Dakota.

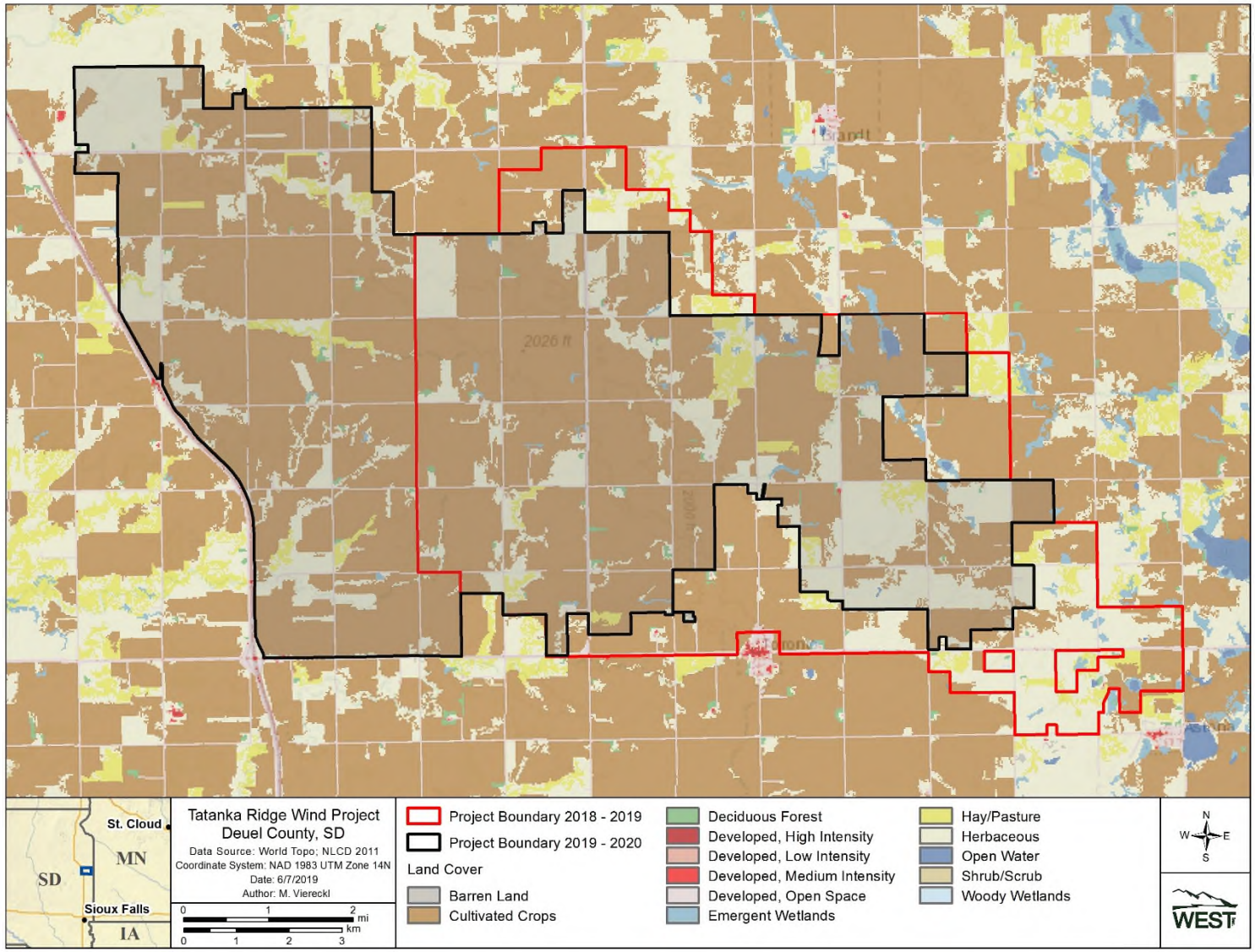


Figure 2. Land cover at the Tatanka Ridge Wind Project (US Geological Survey National Land Cover Database 2011, Homer et al. 2015) in Deuel County, South Dakota.

Table 1. Land cover types, coverage, and composition within the Tatanka Ridge Wind Project, Deuel County, South Dakota.

Habitat	Acres	% Composition
Cultivated Crops	14,907	65.1
Herbaceous	5,576	24.3
Developed, Open Space	1,058	4.6
Hay/Pasture	893	3.9
Emergent Herbaceous Wetlands	256	1.1
Deciduous Forest	127	0.6
Open Water	60	0.3
Developed, Low Intensity	25	0.1
Developed, Medium Intensity	3	<0.1
Developed, High Intensity	<1	<0.1
Total	**22,905**	**100**

Data from the US Geological Survey National Landcover Database (2011), Homer et al. 2015.
Sums may not equal total values shown due to rounding.

METHODS

This study contains the following survey types: 1) fixed-point large bird use surveys, 2) fixed-point small bird use surveys, and 3) incidental wildlife observations.

Fixed-point Large Bird and Eagle Use Surveys

The objective of the fixed-point large bird use surveys was to estimate the spatial and temporal use of the Project area by large birds, particularly eagle species. Fixed-point avian use surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). Eagle data were collected in accordance with the ECPG (USFWS 2013) as well as the eagle permit rules published on December 16, 2016.

Survey Plots

Fourteen points were originally selected to survey the representative habitats and topography of the Project, while achieving relatively even coverage of the overall Project area (Figure 3). One of the original survey locations, Point 15, was relocated to Point 18 after eight months of survey, as it was consistently difficult to access safely in the original location. Additionally, due to an expansion of the Project boundary, and in order to achieve the ECPG recommended 30% coverage, the number of survey locations increased to 21 for the final two months of the study; these new locations were Points 19–25. Consequently, avian spatial use across all locations is not directly comparable. To avoid overlap, WEST generated observation points using a systematic sampling scheme with a random start in ArcGIS (Geographic Information System software), then micro-sited the locations along public roads. Large bird observations were recorded within an 800-meter (m) radius circle centered on each survey point.

Survey Methods

Surveys were conducted for 60 minutes (min) for all large birds, focusing on eagle species whenever they were observed. All large birds observed were assigned a unique observation number, regardless of distance from the observer. Some observations may have been repeated sightings of the same bird. Observations of birds outside the survey plot were recorded and included in the development of species composition, relative abundance, and species diversity metrics, but were not included in analyses of avian use and flight height metrics. Large birds included waterbirds, waterfowl, grebes and loons, shorebirds, gulls and terns, diurnal raptors, owls, vultures, some upland game birds (ring-necked pheasant [*Phasianus colchicus*], wild turkey [*Meleagris gallopavo*]), doves and pigeons, large corvids (i.e., ravens, magpies, and crows), and goatsuckers. Sensitive species include federally or state-listed species, species of special concern as designated by South Dakota Game, Fish, and Parks (SDGFP), and Birds of Conservation Concern (BCC) within Bird Conservation Region (BCR) 11 (USFWS 2008).

WEST recorded the following information during each fixed-point avian use survey: date, start and end time, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover). Additionally, the following data were recorded for each observation:

- species (or best possible identification)
- number of individuals
- distance from plot center when first observed
- closest distance observed
- flight height above ground level (AGL)
- flight direction
- activity (e.g., flying or perched)

Approximate initial flight height, lowest height, highest height, flight direction, and distance from the plot center when first observed were recorded to the nearest 5-m. Distances were estimated based on mapped landmarks.

Bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos)* observations were recorded at 1-min intervals when an eagle was within the 800-m plot and at or below 200-m AGL, per the ECPG (USFWS 2013; [i.e., eagle minutes]). Flight height, distance, and activity (e.g., flying or perched) were also recorded during each 1-min interval. Eagles observed outside of plots, or at heights more than 200-m, were recorded, but not included in the eagle-minute analyses. Flight paths of large birds were mapped and subsequently digitized to qualitatively assess areas of eagle use within the proposed Project area.

Observation Schedule

Sampling intensity was designed to document avian use and behavior by habitat and season within the Project. Avian use surveys were conducted once per month during the following

seasons: spring (April 20 – May 31, 2018 and March 1 – March 31, 2019), summer (June 1 – August 31, 2018), fall (September 1 – November 30, 2018) and winter (December 1, 2018 – February 28, 2019). Surveys were conducted during daylight hours and the start location varied so that each location was surveyed across approximately all daylight hours during a season. This survey approach is consistent with the recommendations included in USFWS ECPG and the survey requirements described in the revised Eagle Permit Rules issued in 2016. Observation points were scheduled to be surveyed the same number of times. Surveys were missed on occasion due to poor visibility as a result of weather conditions or site access issues (e.g., sub-zero temperatures or impassable roads).

Fixed-point Small Bird Use Surveys

The objective of the fixed-point small bird use surveys was to provide a species list of small birds observed in the Project, document small bird relative abundance, and provide data to estimate temporal and spatial use of the Project area by small birds. The small-bird use survey locations were the same as the large bird survey points (Figure 3). Small birds included cuckoos, kingfishers, passerines, swifts, hummingbirds, woodpeckers, and unidentified birds.

In order to be in full compliance with the survey protocols codified in the December 16, 2016 Eagle Rule, the 10-min small bird surveys preceded the 60-min large bird survey observation period. The survey radius of the circular plots was 100-m for small birds, and the estimated distance to each bird observed was recorded to the nearest 5-m interval. The date, start and end time of the observation period, species or best possible identification, number of individuals, sex and age class, distance from plot center when first observed, closest distance, flight height above ground level, activity, and habitat were recorded.

Incidental Observations

To provide information on wildlife use of the Project area outside of observations recorded during standardized surveys, biologists also recorded wildlife observed incidentally. Biologists recorded all sensitive species, rare species or unusual behavior observations, and other notable birds observed. Sensitive species include those protected by the federal Endangered Species Act (1973), the Bald and Golden Eagle Protection Act (BGEPA 1940), BCC within BCR 11 (USFWS 2008), and the 2014 South Dakota Wildlife Action Plan (SDWAP 2014). Incidental observations were recorded in a similar fashion to standardized surveys, where the observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, habitat, and flight height were recorded. Locations were recorded by Universal Transverse Mercator coordinates using a hand-held Global Positioning System unit.

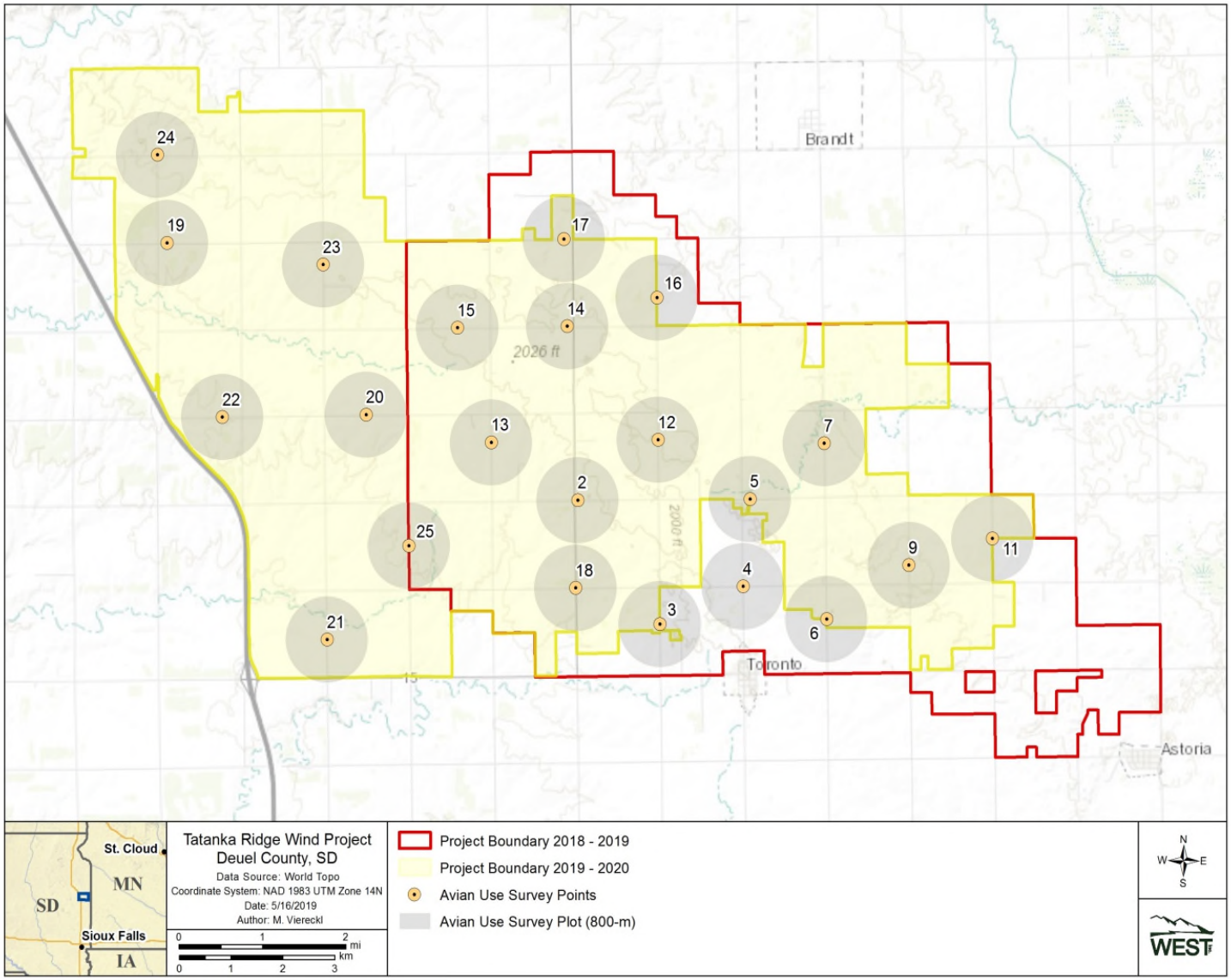


Figure 3. Survey locations for fixed-point avian use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota. Points 19–25 were added in February 2019.

Statistical Analysis

For analysis purposes, a visit was defined as the required length of time, in days, to survey all of the plots once within the study area. Visits were assigned according to the following criteria: 1) a single visit had to be completed in a single season, and 2) a visit could be spread across multiple dates, but a single date could not contain surveys from multiple visits. Under certain circumstances (such as extreme weather conditions), plots were not surveyed during some visits. In these cases, a visit might not have constituted a survey of all plots.

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. Potentially erroneous data were identified using a series of database queries. Irregular codes or questionable data were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

Data Compilation and Storage

A Microsoft® SQL Server database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined protocol to facilitate subsequent QA/QC and data analysis. All data forms and electronic data files were retained for reference. QA/QC measurements implemented for report writing included review of the final document by a technical editor, peer (research biologist), project manager, and senior manager.

Avian Diversity and Species Richness

Avian diversity was illustrated by the total number of species observed. Species lists (with the number of observations and groups) were generated by season and included observations of avian species detected during surveys, regardless of their distance from the observer. In some cases, the tally may have represented repeated sightings of the same individual. For example, a sum of 50 observations of northern harrier (*Circus hudsonius*) may be 50 different birds, or it may be one bird observed on 50 separate visits, or something in between. Species richness, which is defined as the number of species observed per point, was calculated for each season by averaging the total number of species observed within each plot during a visit, then averaging across plots within each visit, followed by averaging across visits within the season. Overall species richness was calculated as a weighted average of seasonal values by the number of days in each season. Species diversity and richness were compared among seasons for fixed-point bird use surveys. Species diversity and richness were calculated separately for large birds and small birds.

Avian Use, Percent of Use, and Frequency of Occurrence

For generating standardized fixed-point avian use estimates, large birds detected within the 800-m radius plot during the 60-min survey were used in the analysis; small birds recorded within

a 100-m radius during the 10-min surveys were analyzed separately. The metric used to measure mean avian use was the number of individuals per plot per survey. These standardized estimates of mean avian use were used to compare differences among bird types, seasons, survey points, and other studies where similar methods were used. Mean use by season was calculated by summing the total number of birds seen within each plot during a visit, then averaging across plots within each visit, followed by averaging across visits within the season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. Estimates were calculated separately for large and small birds.

Exposure to risk at a wind facility is influenced by the extent to which a species uses the area (percent of use) and how often use occurs (frequency of occurrence). Percent of use and frequency of occurrence provide relative measures of species exposure to the proposed facility.

For the Project, percent of use was calculated as the proportion of large or small bird mean use attributable to a particular bird type or species. Frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. For example, flocks of waterfowl, waterbirds, and shorebirds can compose several dozen, hundred, or thousands of individual birds, which would result in a very high percentage of use. However, examining the percent of use alone would not account for the acute exposure to the facility associated with a small number of very large flocks (low frequency of occurrence). A high percent of use may indicate that a species has higher exposure relative to other species, but when the exposure is acute, the species may be less likely to be affected. Conversely, a species that has a low percentage of use and a high frequency of occurrence would have long-term exposure to the facility, increasing the likelihood that this species may be affected by the facility. Therefore, exposure to facility infrastructure is assessed most accurately by evaluating both percent of use and frequency of occurrence.

Flight Height Characteristics and Behavior

Avian flight height characteristics are important metrics to assess relative exposure. Flight height information was used to calculate the percentage of large birds observed flying within the rotor-swept height (RSH) for turbine models likely to be used. A RSH for potential collision with a turbine blade of 25−150 m AGL was used for the purposes of the analysis. For this analysis, below the RSH is less than 25 m AGL, within the RSH is 25−150 m AGL, and above the RSH is greater than 150 m AGL. The flight height recorded during the initial observation was used to calculate the percentage of birds flying within the RSH and mean flight height. The percentage of birds flying within the RSH at any time was calculated using the lowest and highest flight heights recorded.

Exposure Index

The exposure index is used as a relative measure of species-specific risk of turbine collision and the species most likely to occur as fatalities at the wind energy facility. A relative index of large

bird exposure (R) was calculated for avian species observed during the surveys using the following formula:

$$R = A_i * P_f * P_t$$

Where A equals mean relative use for species *i* (large bird observations within 800 m of the observer or 100 m for small birds) averaged across all surveys. P_f equals the proportion of all observations of species *i* where activity was recorded as flying (an index to the approximate percentage of time species *i* spends flying during the daylight period), and P_t equals the proportion of all initial flight height observations of species *i* within the likely RSH. The exposure index does not account for other possible collision risk factors, such as foraging or courtship behavior.

Spatial Use

Large bird flight paths were qualitatively compared to study area characteristics (e.g., topographic features). The objective of mapping large bird locations and flight paths was to identify areas of concentrated use by diurnal raptors and other large birds and/or consistent flight patterns within the study area. This information can be useful in turbine layout design to reduce risk to avian species. Small bird spatial use was measured as mean use by survey point.

RESULTS

Fixed-Point Large Bird Use Surveys

One hundred seventy-eight fixed-point large bird use surveys were conducted from April 20, 2018 to March 26, 2019 (Table 2).

Avian Diversity and Species Richness

Forty-four large bird species were observed over the course of the fixed-point large bird use surveys (Table 2). A mean of 1.84 large bird species/800-m plot/60-min survey was recorded. Bird diversity (the number of species identified) for large birds was highest during spring (26 species), and fall (24 species), followed by summer (21 species), and winter (five species; Table 2). Large bird species richness was highest in summer (2.64 species/800-m plot/60-min survey), followed by spring (2.40), fall (1.79), and winter (0.49; Table 2).

Table 2. Summary of large bird diversity (number of species) and species richness (species/800-meter plot/60-minute survey), and sample size by season and overall during fixed-point large bird use surveys (FPLB) at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

Season	Number of Visits	Number of FPLB Surveys Conducted	Number of Species[a]	Species Richness
Spring	3	48	26	2.40
Summer	3	42	21	2.64
Fall	3	42	24	1.79
Winter	3	46	5	0.49
Overall	**12**	**178**	**44**	**1.84**

[a] Number of Species: count of bird species observed in the survey plots within and across seasons. Unidentified birds are included in this count.

During fixed-point large bird surveys, 8,424 large bird observations were recorded within 470 separate groups (defined as one or more individuals; Appendix A1). One species (snow goose [*Anser caerulescens*]; 2.7% of all species) accounted for 74.9% of all large bird observations (6,310 observations; Appendix A1). Franklin's gull (*Leucophaeus pipixcan*) was the second most abundant species observed, and accounted for 6.4% of all large bird observations (542 records; Appendix A1). All other large bird species each accounted for less than 3.5% of the total number of large bird observations. Seventy-eight diurnal raptor observations were recorded within the Project, representing nine species (Appendix A1).

Avian Use, Percent of Use, and Frequency of Occurrence

Mean avian use, percent of use, and frequency of occurrence were calculated by season for all bird types and species (Table 3, Appendix B1). The highest overall large bird use occurred during the spring (121.15 observations/800-m plot/60-min survey), followed by fall (21.21), summer (6.43), and winter (2.66; Table 3). Elevated large bird use in spring was influenced by high use of waterfowl, particularly snow goose (105.70). Fall use was highest by gulls/terns, whereas summer and winter use where highest by shorebirds and doves/pigeons respectively (Appendix B1).

Waterbirds

Waterbird use was recorded during fall, spring, and summer (Table 3); no waterbird use was recorded in winter. Waterbirds had the highest use during summer (1.21 observations/800-m plot/60-min survey). Summer waterbird use values were primarily shaped by American white pelican (*Pelecanus erythrorhynchos)* use (Appendix B1). Waterbirds made up 18.9% of all large bird observations in summer, 5.6% in fall, and less than 0.1% of spring observations (Table 3, Appendix B1). Waterbirds were recorded during 2.4% to 14.3% of surveys during seasons in which they occurred (Table 3, Appendix B1).

Waterfowl

Waterfowl use was the highest in spring (117.21 observations/800-m plot/60-min survey) and was lower in fall and summer (1.64 and 0.90 respectively; Table 3, Appendix B1). No use was recorded in the winter. Most waterfowl use was due to snow goose, and to a lesser extent Canada goose (*Branta Canadensis)* and greater-white-fronted goose (*Anser albifrons;* Appendix B1). Waterfowl

made up 96.8% of all large bird observation in the spring, 14.1% in summer, and 7.7% in fall (Table 3, Appendix B1). Waterfowl were recorded during 9.5% to 45.0% of surveys during seasons in which they occurred (Table 3, Appendix B1).

Shorebirds

Shorebirds showed the highest use of all bird types during the summer (1.71 observations/800-m plot/60-min survey) and accounted for 26.7% of all summer large bird observations (Table 3, Appendix B1). No shorebird use was recorded in the winter. Killdeer (*Charadrius vociferus)* had the highest use among shorebird species in all seasons (Appendix B1). Shorebird use in spring was 0.89 observations/800-m plot/60-min survey and 0.26 in the fall. Shorebirds were observed between 7.1% and 57.1% of surveys during seasons in which they occurred (Table 3, Appendix B1).

Gulls/Terns

Gull/tern use was only recorded during the summer and fall and had the highest use of all large bird types in the fall (13.86 observations/800-m plot/60-min survey; Table 3, Appendix B1). Franklin's gulls contributed the highest use in the summer and fall (Appendix B1) Gulls/terns accounted for 65.3% of overall large bird observations in fall and 0.4% in summer (Table 3, Appendix B1). Gulls/terns were observed during 2.4% of summer surveys and 14.3% of fall surveys (Table 3, Appendix B1).

Diurnal Raptors

Diurnal raptor use was observed over all seasons, with highest use during fall (1.19 observations/ 800-m plot/60-min survey), followed by spring (0.32), summer (0.29), and winter (0.03; Table 3, Appendix B1). Red-tailed hawk (*Buteo jamaicensis*) made up most diurnal raptor use during fall, spring, and summer, while bald eagle accounted for all diurnal raptor use during winter (Appendix B1). Diurnal raptors accounted for 5.6% of large bird use in fall, 4.4% of large bird use in summer, 1.0% in winter, and 0.3% in spring (Table 3, Appendix B1). Diurnal raptors were observed during 47.6% of surveys during fall, 24.8% of spring surveys, 21.4% of summer surveys, and 2.6% of winter surveys (Table 3, Appendix B1).

The total survey effort for eagle use was 178 hours. Two bald eagles and two golden eagles were observed during the fixed-point surveys with no additional eagles of either species observed incidentally. See the *Eagle Use* section for further information.

Vultures

Turkey vulture (*Cathartes aura*) was the only vulture species observed (Appendix A1 and B1), and use by turkey vultures was recorded during spring (0.21 observation/800-m plot/60-min survey), summer (0.05), and fall (0.12; Table 3, Appendix B1); no use was recorded during the winter. Turkey vultures accounted for 0.7% of overall large bird use during summer, 0.2% during spring, and 0.6% during fall (Table 3, Appendix B1). Turkey vultures were observed between 4.8% and 7.1% of surveys during season in which they occurred (Table 3, Appendix B1).

Table 3. Mean large bird use (number of observations/800-meter plot/60-minute [min] survey), percent of total use (%), and frequency of occurrence (%) for each large bird type by season during the 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Waterbirds	**0.04**	**1.21**	**1.19**	**0**	**<0.1**	**18.9**	**5.6**	**0**	**4.0**	**14.3**	**2.4**	**0**
Waterfowl	**117.21**	**0.90**	**1.64**	**0**	**96.8**	**14.1**	**7.7**	**0**	**45.0**	**21.4**	**9.5**	**0**
Shorebirds	**0.89**	**1.71**	**0.26**	**0**	**0.7**	**26.7**	**1.2**	**0**	**32.9**	**57.1**	**7.1**	**0**
Gulls/Terns	**0**	**0.02**	**13.86**	**0**	**0**	**0.4**	**65.3**	**0**	**0**	**2.4**	**14.3**	**0**
Diurnal Raptors	**0.32**	**0.29**	**1.19**	**0.03**	**0.3**	**4.4**	**5.6**	**1.0**	**24.8**	**21.4**	**47.6**	**2.6**
Accipiters	0	0	0.05	0	0	0	0.2	0	0	0	4.8	0
Buteos	0.28	0.26	0.69	0	0.2	4.1	3.3	0	23.1	19.0	31.0	0
Northern Harrier	0.02	0.02	0.26	0	<0.1	0.4	1.2	0	2.4	2.4	21.4	0
Eagles	0.02	0	0.02	0.03	<0.1	0	0.1	1.0	1.7	0	2.4	2.6
Falcons	0	0	0.12	0	0	0	0.6	0	0	0	7.1	0
Other Raptors	0	0	0.05	0	0	0	0.2	0	0	0	4.8	0
Vultures	**0.21**	**0.05**	**0.12**	**0**	**0.2**	**0.7**	**0.6**	**0**	**7.1**	**4.8**	**7.1**	**0**
Upland Game Birds	**0.64**	**0.62**	**0.17**	**0.99**	**0.5**	**9.6**	**0.8**	**37.4**	**36.0**	**40.5**	**11.9**	**15.8**
Doves/Pigeons	**0.63**	**1.57**	**1.98**	**1.48**	**0.5**	**24.4**	**9.3**	**55.6**	**21.7**	**59.5**	**33.3**	**22.0**
Large Corvids	**1.21**	**0.05**	**0.81**	**0.16**	**1.0**	**0.7**	**3.8**	**6.1**	**25.2**	**4.8**	**11.9**	**8.5**
Large Birds Overall	**121.15**	**6.43**	**21.21**	**2.66**	**100**	**100**	**100**	**100**				

Upland Game Birds

Upland game bird use was highest in winter (0.99 observation/800-m plot/60-min survey), followed by spring (0.64), summer (0.62), and fall (0.17; Table 3, Appendix B1). Two species were observed: ring-necked pheasant in all four seasons, and wild turkey in summer only (AppendixB1). Upland game birds made up 37.4% of use in winter, 9.6% of use in summer, 0.8% of use in fall, and 0.5% of use in spring (Table 3, Appendix B1). Upland game birds were observed between 11.9% and 40.5% of surveys (Table 3, Appendix B1).

Doves/Pigeons

Doves/pigeons were observed in every season. Use was highest in the fall (1.98 observation/ 800-m plot/60-min survey), followed by summer (1.57), winter (1.48), and spring (0.63; Table 3; Appendix B1). Rock pigeon (*Columba livia)* accounted for the majority of dove/pigeon use in all seasons, with the exception of summer where mourning dove (*Zenaida macroura)* use was higher. Doves/pigeons made up the majority (55.6%) of all large bird use in the winter. Doves/pigeons were observed between 21.7% and 59.5% of surveys (Table 3a, Appendix B1).

Large Corvids

American crow (*Corvus brachyrhynchos*) was the only large corvid observed and they were recorded in all four seasons (Appendix A1 and B1). American crow use was highest in spring (1.21 observation/800-m plot/60-min survey), followed by fall (0.81), winter (0.16), and summer (0.05; Appendix B1). American crows made up between 0.7% and 6.1% of large bird use and were observed between 4.8% and 25.2% of surveys each season (Appendix B1).

Avian Flight Height Characteristics and Behavior

Flight height characteristics, based on initial flight height observations and estimated use, were calculated for bird types and species (Table 4, Appendix C1). Overall, 83.6% of flying large birds were recorded within the RSH (i.e., 25−150 m AGL), 13.7% were below the RSH, and 2.7% were flying above the RSH (Table 4). Based on 74 observations, most of flying diurnal raptors were observed below the RSH (64.9%), 25.7% were within the RSH, and 9.5% were above the RSH. Diurnal raptors had the fourth highest percentage of birds within the RSH due to buteo observations recorded at this height (Table 4). Waterbirds had the highest percentage of all flying large birds recorded within the RSH (96.1%, based on 103 observations), followed closely by waterfowl (95.5%, based on 7,015 observations). Vultures were observed in the RSH 31.2% of the time, and 11.3% of flying gulls/terns were observed within the RSH (Table 4). One hundred percent of upland game birds, doves/pigeons, and large corvids, and 98.6% of shorebirds were observed flying below the RSH (Table 4).

Of the species recorded flying, 13 species were observed flying within the estimated RSH during half or more of initial observations and seven species were observed flying within the RSH during less than half of initial observations (Table 5).

Table 4. Group and individual observation flight height characteristics by large bird type and raptor subtype during fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight height Categories		
					0−25 m	25−150 m[a]	>150 m
Waterbirds	**11**	**103**	**76.73**	**100**	**3.9**	**96.1**	**0**
Waterfowl	**83**	**7,015**	**45.39**	**99.6**	**2.0**	**95.5**	**2.6**
Shorebirds	**37**	**70**	**5.43**	**57.4**	**98.6**	**1.4**	**0**
Gulls/Terns	**11**	**583**	**54.91**	**100**	**81.8**	**11.3**	**6.9**
Diurnal Raptors	**67**	**74**	**42.70**	**96.1**	**64.9**	**25.7**	**9.5**
Accipiters	2	2	4.50	100	100	0	0
Buteos	43	49	55.28	94.2	57.1	30.6	12.2
Northern Harrier	12	13	6.83	100	100	0	0
Eagles	3	3	27.33	100	33.3	66.7	0
Falcons	5	5	14.20	100	80.0	20.0	0
Other Raptors	2	2	120.00	100	0	50.0	50.0
Vultures	**11**	**16**	**20.09**	**100**	**68.8**	**31.2**	**0**
Upland Game Birds	**12**	**56**	**4.42**	**49.1**	**100**	**0**	**0**
Doves/Pigeons	**77**	**229**	**8.31**	**91.6**	**100**	**0**	**0**
Large Corvids	**29**	**97**	**6.38**	**86.6**	**100**	**0**	**0**
Overall	**338**	**8,243**	**27.74**	**97.9**	**13.7**	**83.6**	**2.7**

[a] The likely rotor-swept height for potential collision with a turbine blade, or 25−150 m above ground level
Obs = observations.

Table 5. Relative exposure index and flight characteristics for large bird species[a] during 60-minute fixed-point large bird use surveys (FPLB) at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH[b] Based on Initial Obs.	Exposure Index	% Within RSH at Any Time
snow goose	8	26.64	100	98.0	26.12	98.0
greater white-fronted goose	4	1.22	100	100	1.22	100
Canada goose	32	1.29	99.2	68.3	0.87	78.0
Franklin's gull	9	3.22	100	12.2	0.39	81.4
double-crested cormorant	1	0.30	100	100	0.30	100
American white pelican	5	0.29	100	100	0.29	100
mallard	26	0.30	90.6	52.1	0.14	56.2
red-tailed hawk	35	0.24	95.1	33.3	0.08	64.1
unidentified duck	4	0.25	100	18.4	0.05	49.0
turkey vulture	11	0.10	100	31.2	0.03	81.2
common merganser	1	0.03	100	100	0.03	100
trumpeter swan	1	0.02	100	100	0.02	100
bald eagle	1	<0.01	100	100	<0.01	100
Wilson's snipe	1	0.04	16.7	100	<0.01	100
unidentified buteo	3	0.02	100	33.3	<0.01	33.3
Swainson's hawk	3	0.04	83.3	20.0	<0.01	80.0
unidentified raptor	2	0.01	100	50.0	<0.01	50.0
merlin	1	<0.01	100	100	<0.01	100
great blue heron	3	0.02	100	33.3	<0.01	66.7
golden eagle	2	0.01	100	50.0	<0.01	50.0

[a] Only includes species with actual exposure index values; see Appendix C for full listing.
[b] The likely "rotor-swept height" (RSH) for potential collision with a turbine blade, or 25−150 meters above ground level.
Obs = observations.

Exposure Index

A relative exposure index based on initial flight height observations and mean use estimate was calculated for each species. Species that had exposure to the RSH are listed in Table 5 and a complete list of all species is presented in Appendix C1. Due to observations within the RSH and relatively high use, snow goose had the highest exposure index (26.12), followed by greater white-fronted goose (1.22), Canada goose (0.87), and Franklin's gull (0.39; Table 5, Appendix C1).

Spatial Use

For all large bird species combined, use was highest at Point 5 (494.50 observations/60-min survey; Figure 4a, Appendix D1). Point 5 is centrally located within the Project area, and is without any discernable topographic or landscape features that distinguish it from other observations points. Large bird use at other points ranged from 1.00 to 43.58, with the exception of Point 19 where zero use was recorded. The high mean use estimate for Point 5 was due to high waterfowl use (specifically, snow goose) at this point (Figure 4b, Appendix D1). Diurnal raptor use was remarkably consistent at nearly all points where use was recorded, ranging from 0.08 at Point 3, to 0.75 at Point 12 (Figure 4c, Appendix D1). Five of the seven points added in the final two months of study did not have any diurnal raptor use recorded (Appendix D1). Gull/tern use was only documented at five locations (Figure 4d). Use by vultures was only documented at six points, and ranged from 0.08 to 0.50 at those points (Appendix D1).

In order to present qualitative use of the landscape, flight paths of all large birds were mapped and digitized by season (Appendix D2). Diurnal raptor flight paths were recorded throughout the Project in every season; no obvious movement corridors were observed, and there was fairly even use across the survey points surveyed for the full year. The survey locations added for the last two months of study (Points 19−25) showed little to no raptor use (Figure 5a, Appendix D2). Red-tailed hawks made up the majority of diurnal raptor flight paths in all four seasons, but more flight paths were recorded in fall than any other season (Appendix D2). Spatial use by eagles is presented below in *Eagle Use*.

Over the course of the year, flight paths for waterfowl were documented more frequently on the southeastern half of the Project than on the western half. Flight paths were recorded at all survey points except for Points 18−21 and 25 (Figure 5b); Despite remarkably high waterfowl use at Point 5 due to large flocks of snow goose, flight path distributions depict equally, if not higher, concentrations at Points 9 and 11 (Figure 5b, Appendix D2). Gull/tern flight paths were documented at only two points (Points 7 and 14); however, gull/tern use was documented at five locations (Figure 5c, Appendix D1).

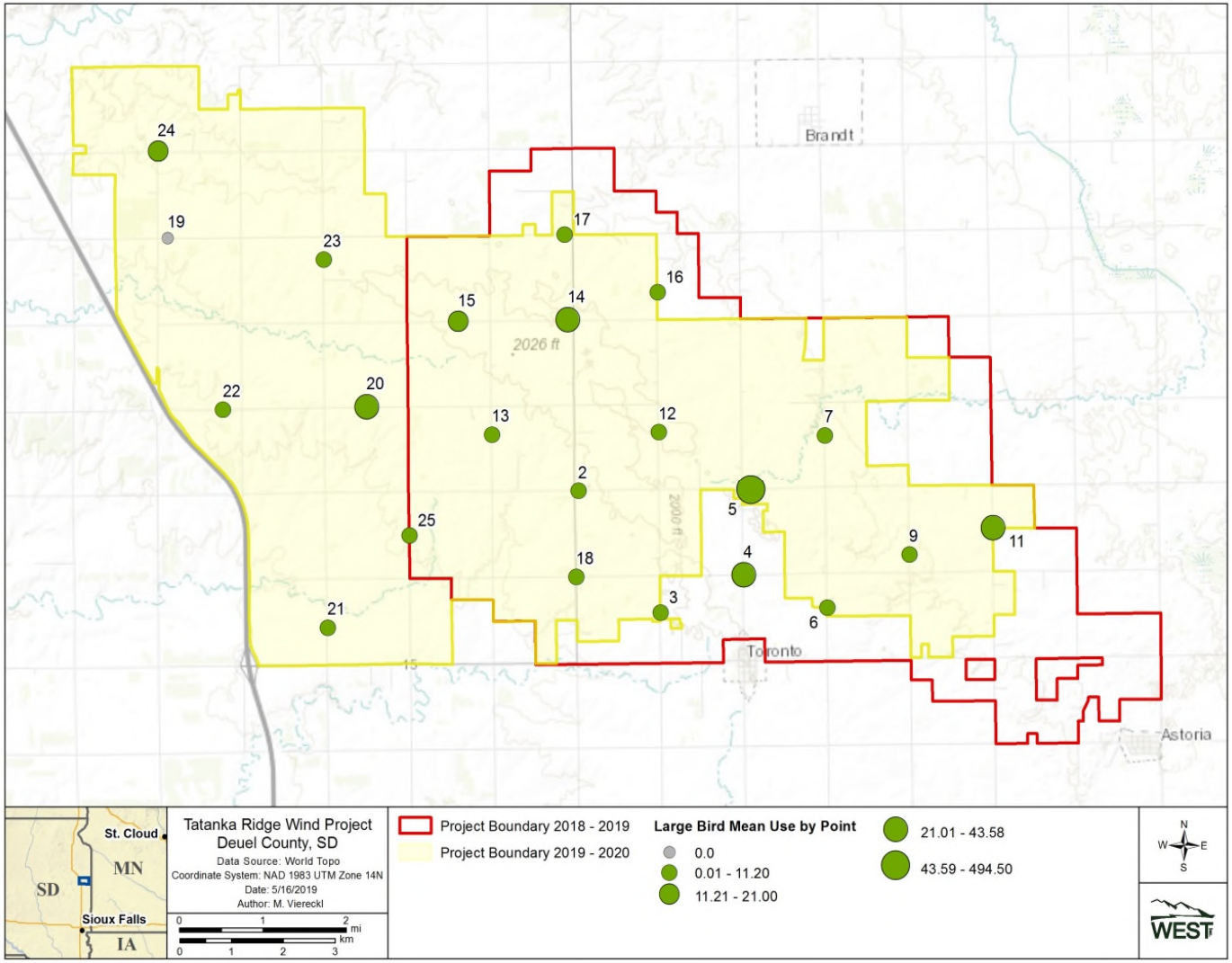


Figure 4a. Large bird use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. Points 19-25 were added in February 2019.

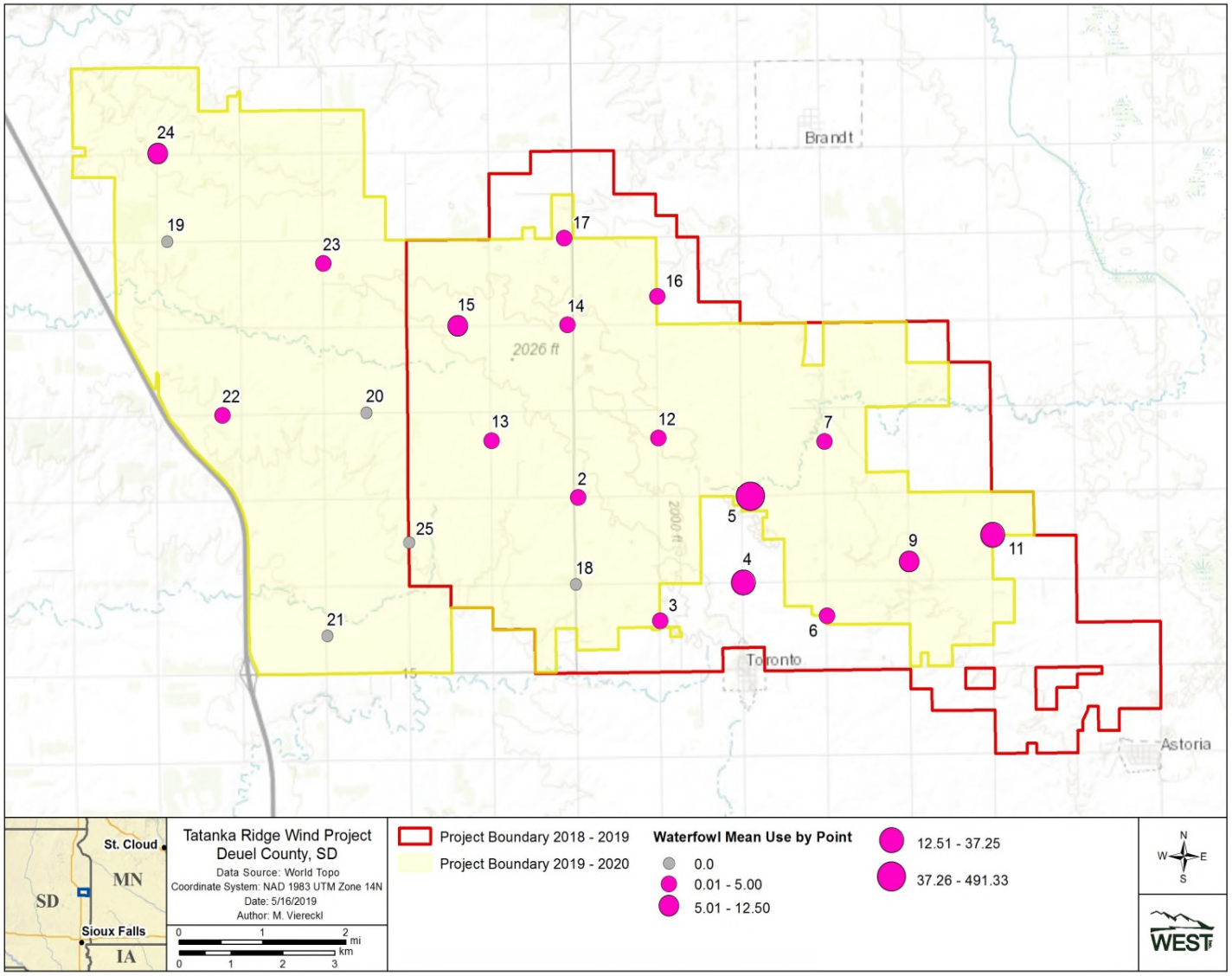


Figure 4b. Waterfowl use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. Points 19-25 were added in February 2019.

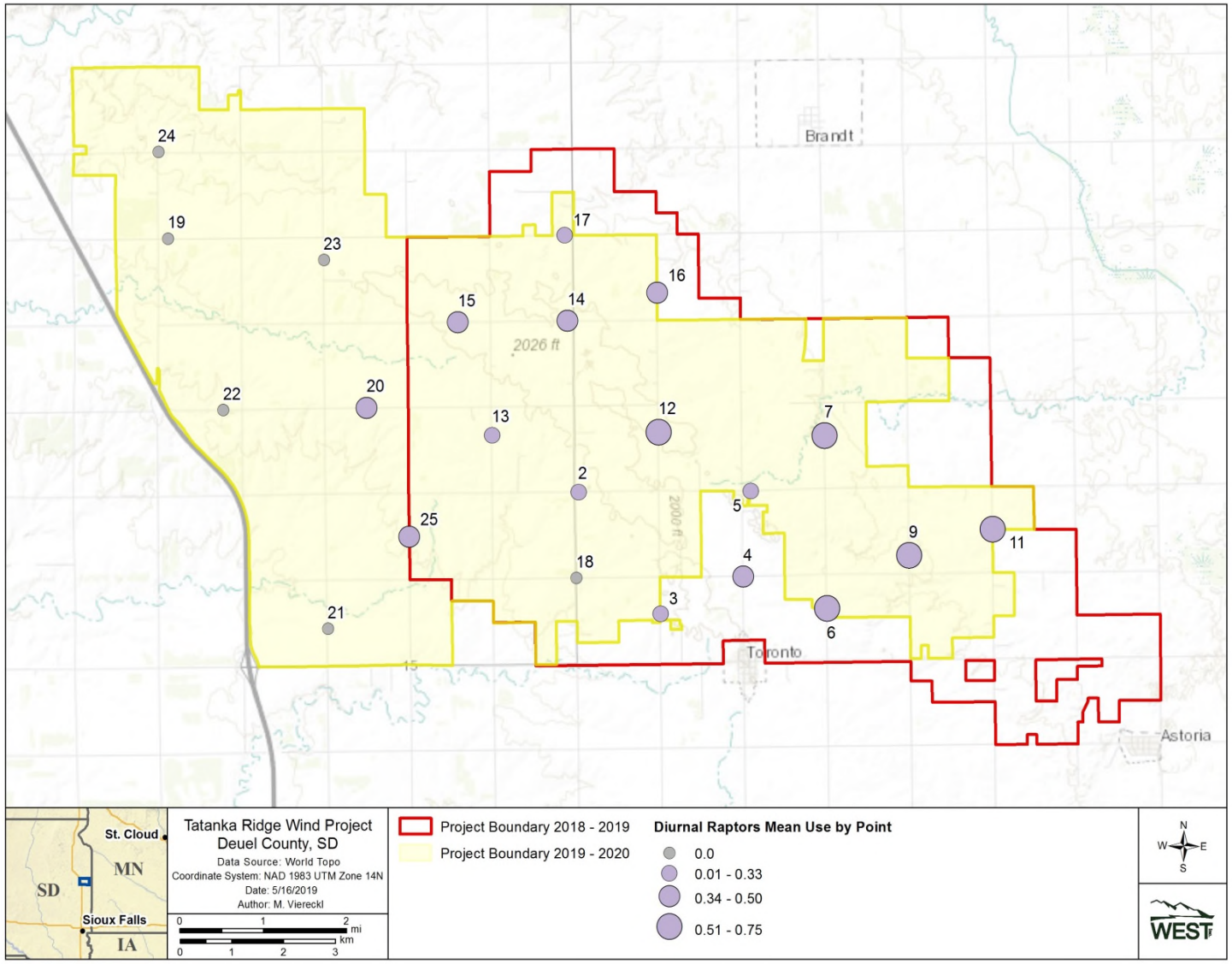


Figure 4c. Diurnal Raptor use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. Points 19-25 were added in February 2019.

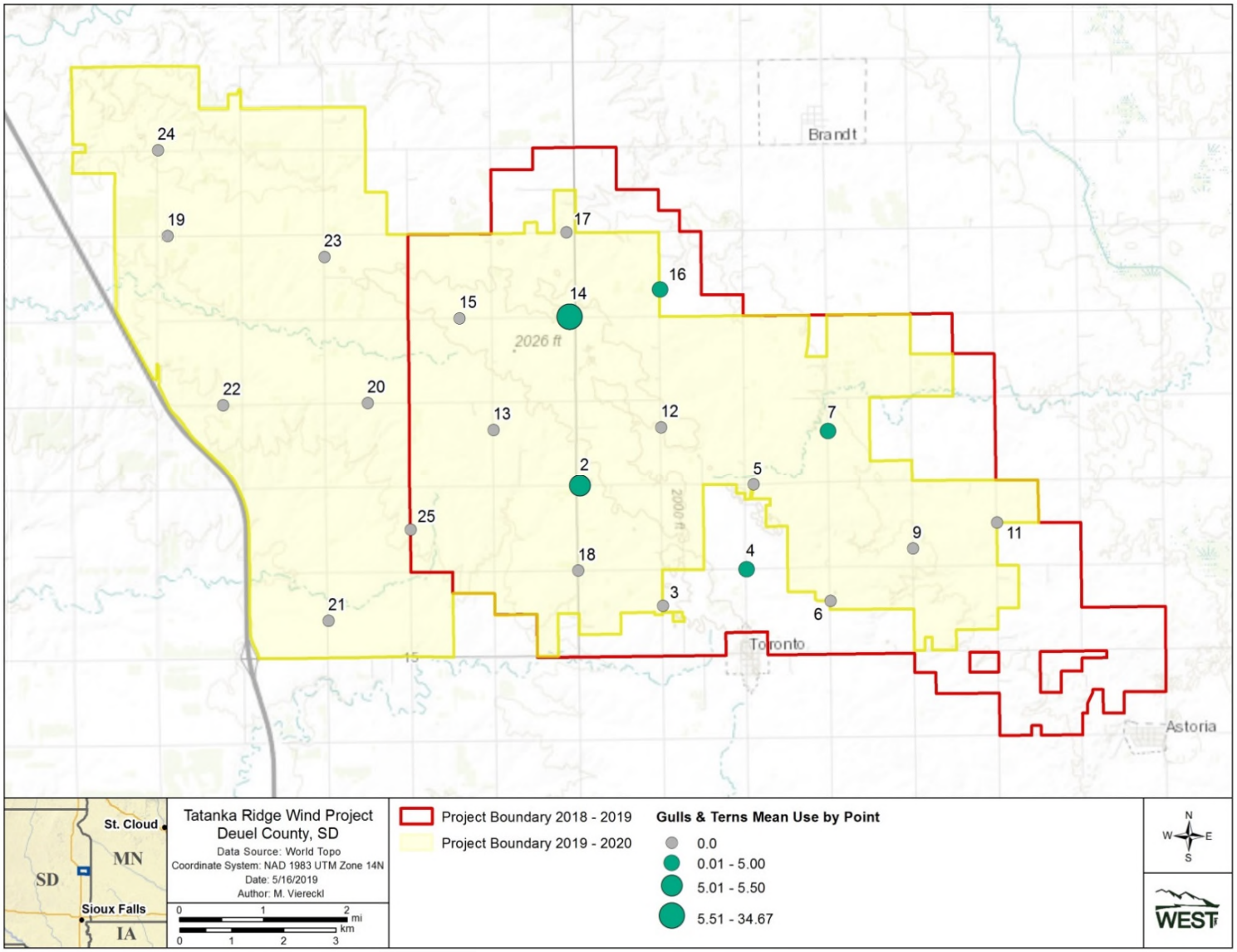


Figure 4d. Gull/Tern use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. Points 19-25 were added in February 2019

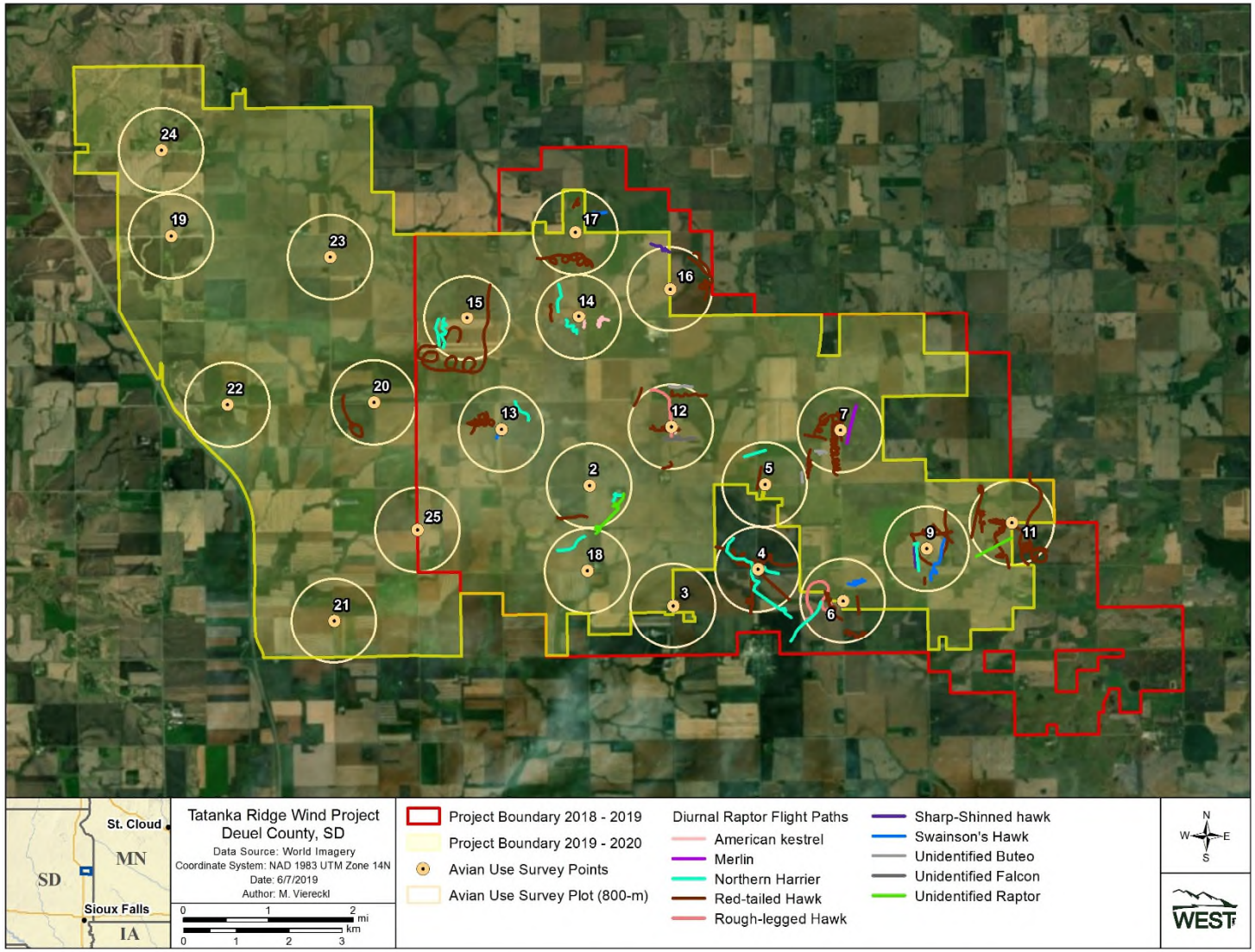


Figure 5a. Flight paths for diurnal raptors by species observed at the Tatanka Ridge Wind Project from April 20, 2018 to March 26, 2019. Points 19-25 were added in February 2019

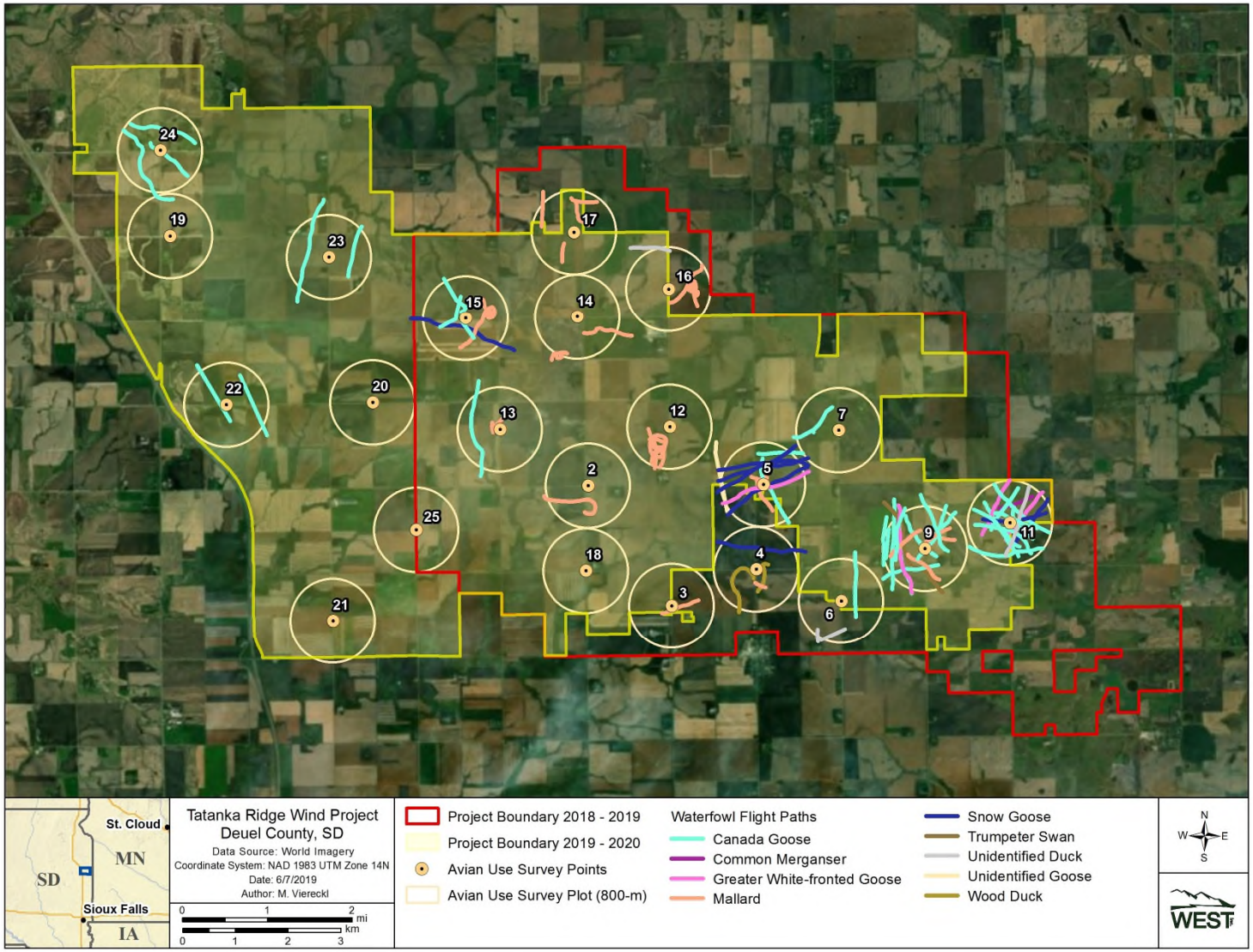


Figure 5b. Flight paths for waterfowl by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019. Points 19-25 were added in February 2019

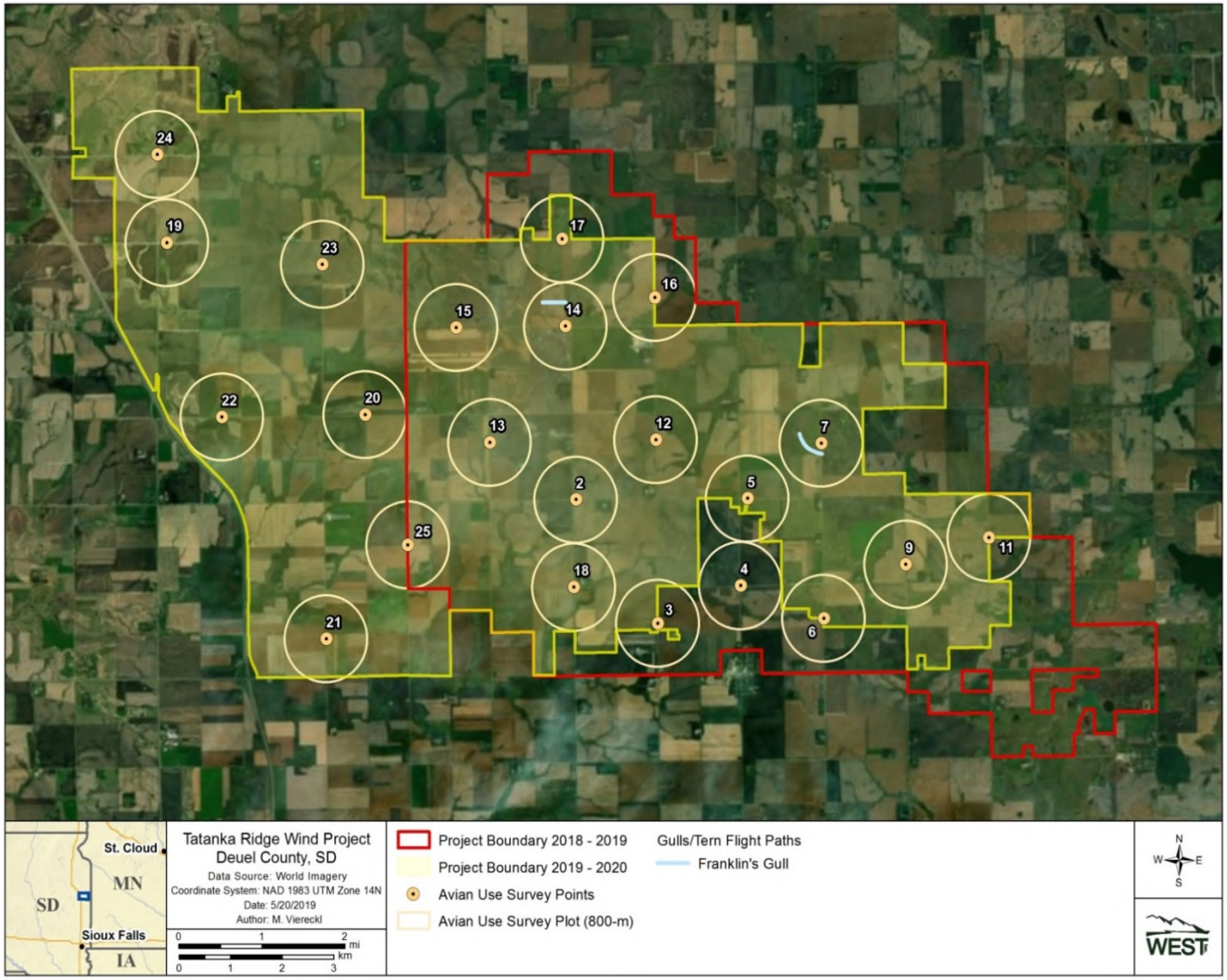


Figure 5c. Flight paths for gulls/terns by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019. Points 19-25 were added in February 2019

Fixed-point Small Bird Use Surveys

One hundred seventy-eight fixed-point small bird use surveys were conducted from April 20, 2018 to March 26, 2019 (Table 6). Overall, small bird use at the Project was low and was made up almost entirely of passerine species.

Table 6. Summary of small bird diversity (number of species) and species richness (species/100-meter plot/10-minute survey), and sample size by season and overall during the fixed-point small bird use surveys (FPSB) at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

Season	Number of Visits	Number of FPSB Surveys Conducted	Number of Species[a]	Species Richness
Spring	3	48	27	1.86
Summer	3	42	31	4.33
Fall	3	42	16	1.17
Winter	3	46	2	0.17
Overall	**12**	**178**	**39**	**1.89**

[a] Number of Species: count of bird species observed in the survey plots within and across seasons. Observations of birds that were not identifiable to type or species were included in this count.

Small Bird Diversity and Species Richness

Thirty-nine small bird species were identified over the course of the fixed-point small bird use surveys (Table 6). A mean of 1.89 small bird species/100-m plot/10-min survey were recorded. Avian diversity for small birds was highest during summer (31), followed by spring (27), fall (16), and was lowest in the winter (2). Small bird species richness was highest during summer (4.33) and spring (1.86), followed by fall (1.17) and winter (0.17; Table 6).

During small bird surveys, 1,248 small bird observations were recorded within 455 separate groups (Appendix A2). Three species (8.8% of all species) accounted for 49.8% of all observations: red-winged blackbird (*Agelaius phoeniceus;* 285 observations), Lapland longspur (*Calcarius lapponicus*; 170 observations), and horned lark (*Eremophila alpestris*; 166 observations; Appendix A2). No other small bird species accounted for more than 4.6% of observations.

Avian Use, Percent of Use, Frequency of Occurrence, and Spatial Use

A 100-m viewshed and 10-min observation period was used for small birds; therefore, descriptive statistics for small bird types are not directly comparable to large bird types. Small bird use was highest during summer and spring (10.33 observations/100-m plot/10-min survey and 9.75, respectively; Table 7, Appendix B2). Fall and winter use values were much lower (4.45 and 2.18; Appendix B2 and Table 7). Small bird use was dominated by passerines, though a few woodpeckers were also recorded. Red-winged blackbirds represented most of the small bird use during spring and fall, and barn swallow (*Hirundo rustica)* account for the majority of small bird use in the summer. Winter small bird use was only recorded for two species, horned lark and blue jay (*Cyanocitta cristata;* Appendix B2). Small bird use, focused within 100 m, was highest at Point 5, with 16.50 observations/10-min survey, and ranged from 0.50 to 12.18 at other points where use was recorded (Figure 6, Appendix D4). Three survey locations had no use documented.

Table 7. Mean small bird use (number of observations/100-meter plot/10-minute [min] survey), percent of total use (%), and frequency of occurrence (%) for each small bird type by season during the 10-min fixed-point small bird use surveys (FPSB) at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019

	Mean Use				% of Use				% Frequency			
Type	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Passerines	9.73	10.29	4.40	2.18	99.8	99.5	98.9	100	69.0	92.9	59.5	16.7
Woodpeckers	0.02	0.05	0.05	0	0.2	0.5	1.1	0	2.4	4.8	4.8	0
Small Birds Overall	**9.75**	**10.33**	**4.45**	**2.18**	**100**	**100**	**100**	**100**				

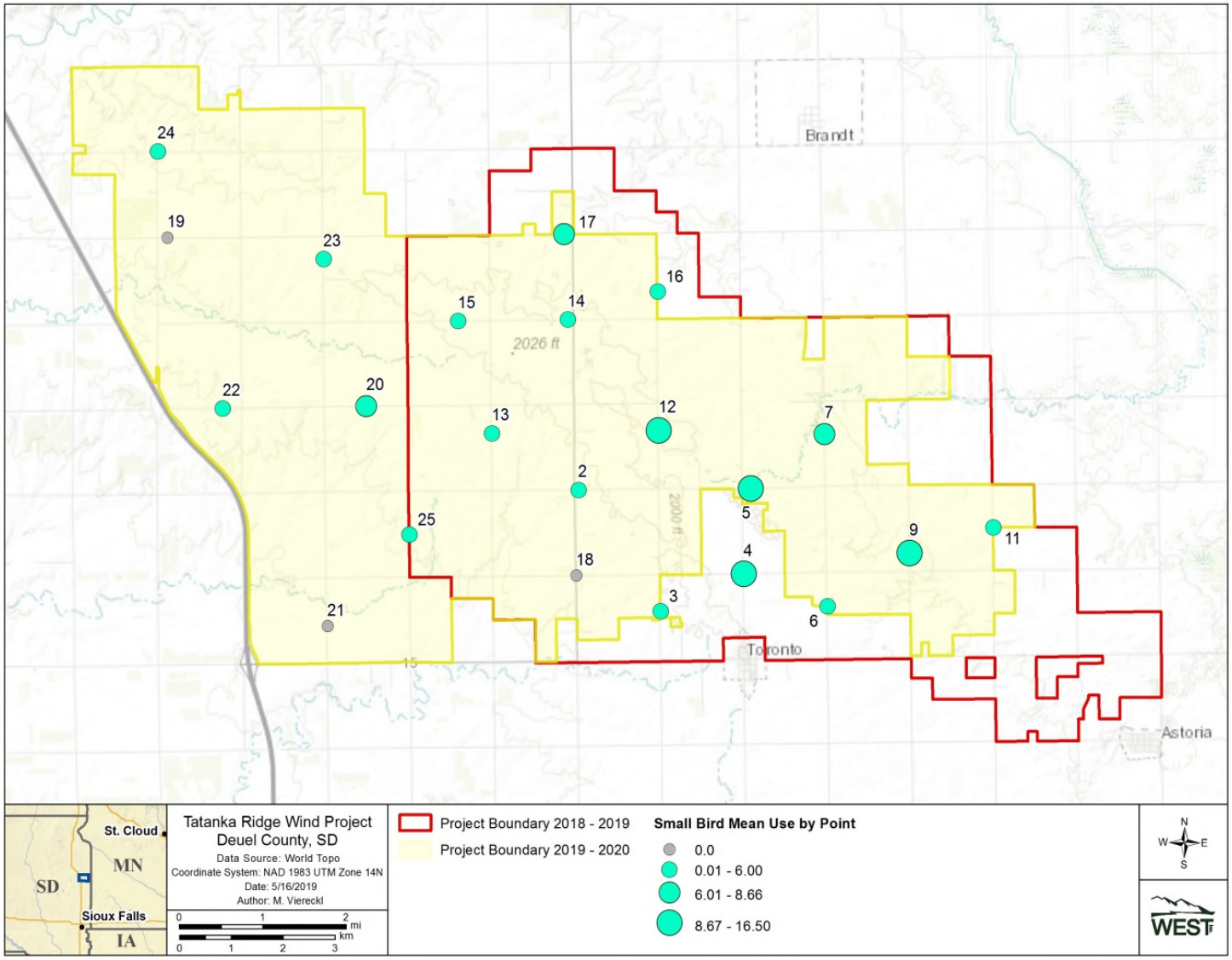


Figure 6. Small bird use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point small bird surveys from April 20, 2018- March 26, 2019. Points 19-25 were added in February 2019

Passerines

Passerines represented nearly all of the small bird use, and passerine use was highest during summer (10.29 observations/100-m plot/10-min survey) followed by spring (9.73), compared to fall (4.40) and winter (2.18; Table 7, Appendix B2). Passerines made up 100% of small bird use during winter, and between 98.9% and 99.8% of small bird use in all other seasons. Passerines were observed between 16.7% and 92.9% of surveys seasonally (Table 7, Appendix B1).

Woodpeckers

Four species of woodpecker were observed at the Project, northern flicker (*Colaptes auratus*), red-headed woodpecker (*Melanerpes erythrocephalus)*, downy woodpecker (*Dryobates pubescens*), and hairy woodpecker (*Dryobates villosus*); Appendix A2 and B2). Mean use was low in all seasons, but was higher in summer and fall (0.05 observation/100-m plot/10-min survey each), compared to spring (0.02); no woodpeckers were observed in winter (Table 7, Appendix B2). Woodpeckers accounted for between 0.2% and 1.1% of small bird use in the seasons in which they were observed. Woodpeckers were observed between 2.4 and 4.8% of surveys seasonally (Table 7, Appendix B2).

Eagle Use

One hundred seventy-eight hours of survey were conducted within the Project from April 20, 2018 to March 26, 2019. Four eagle observations, including two bald eagles and two golden eagles, were recorded during the 60-min fixed-point count large bird surveys, and no eagles were observed incidentally.

Eagle Use by Season

Mean use by eagles across the survey period was 0.0165 eagle observation/800-m survey plot/ 60-min, ranging from zero in summer to 0.026 in winter (Table 8). Spring had the highest number of eagle observations (two observations [one bald eagle and one golden eagle]; Appendix A1), while fall had the highest number of eagle risk minutes (three min; Table 8). In general, use by eagles was very low at the Project, and seasonal trends are difficult to distinguish based on so few observations.

Table 8. Bald and golden eagle risk minutes[a], mean use, and risk minutes per hour of survey, documented by season during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

Season	Bald Eagle Risk Minutes	Golden Eagle Risk Minutes	Survey Effort (hours)	Eagle Use (both species)	Bald Eagle Risk Minutes per Hour of Survey	Golden Eagle Risk Minutes per Hour of Survey
Spring	0	2	48	0.017	0	0.0417
Summer	0	0	42	0	0	0
Fall	0	3	42	0.024	0	0.0714
Winter	1	0	46	0.026	0.0217	0
Total	**1**	**5**	**178**	**0.0165**	**0.0056**	**0.0281**

[a] Minutes flying within 800 meters (m) of the observer and less than 200 m above ground level.

Monthly Trends – Eagle Observations and Minutes

Most months did include any eagle observations; each of the four eagle observations occurred in different months (May, October, and December 2018; and March 2019). Although there were an equal number of bald eagle and golden eagle observations (two each), only one bald eagle observation resulted in any risk minutes (one risk minute), whereas both golden eagle observations recorded risk minutes (Table 9). The month with the highest number of risk minutes was October 2018 (three risk minutes), followed by March 2019 (two risk minutes), and December 2018 (one risk minute; Table 9). Of the four eagles observed, two were observed in spring, one in fall, and one in winter.

Table 9. Total number of bald and golden eagle observations and total number of eagle risk minutes[a] by month recorded during 60-minute fixed-point large bird use surveys[b] at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

Month/Year	Bald Eagle Observations	Golden Eagle Observations	Bald Eagle Risk Minutes	Golden Eagle Risk Minutes
April 2018	0	0	0	0
May 2018	1	0	0	0
June 2018	0	0	0	0
July 2018	0	0	0	0
August 2018	0	0	0	0
September 2018	0	0	0	0
October 2018	0	1	0	3
November 2018	0	0	0	0
December 2018	1	0	1	0
January 2019	0	0	0	0
February 2019	0	0	0	0
March 2019	0	1	0	2
Total	**2**	**2**	**1**	**5**

[a] Minutes flying within 800 meters (m) of the observer and less than 200 m above ground level.

Spatial Patterns

Similar to temporal trends, spatial trends in eagle use are difficult to evaluate due to the low number of observations recorded. Although Point 25 was only surveyed for two months, one golden eagle was observed in March 2019, resulting in this point having the highest eagle use and the second-highest number of eagle risk minutes (two risk minutes; Figures 7 and 8, Table 10). Point 16 showed the greatest number of eagle risk minutes, also due to one golden eagle being observed, with three risk minutes recorded.

Golden eagles were observed at Points 16 and 25. The two observations of bald eagle were at Point 3 (one risk minute) and Point 14 (although the bald eagle was beyond the 800-m survey plot; therefore this observation was not included in the use analysis and zero risk minutes were recorded; Figures 7 and 8, Table 10).

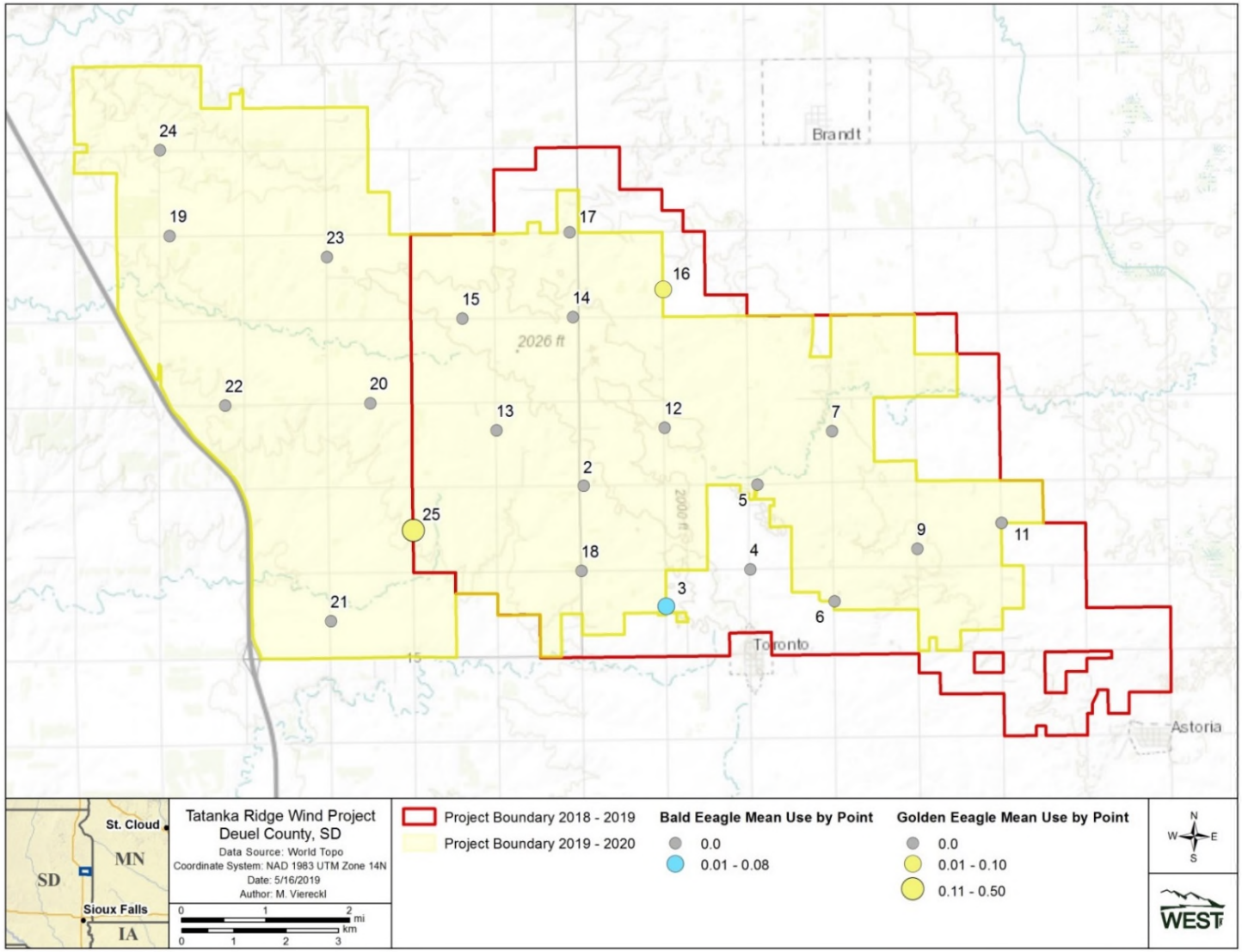


Figure 7. Eagle use by observation point at the Tatanka Ridge Wind Project in Deuel County, South Dakota during fixed-point large bird surveys from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.

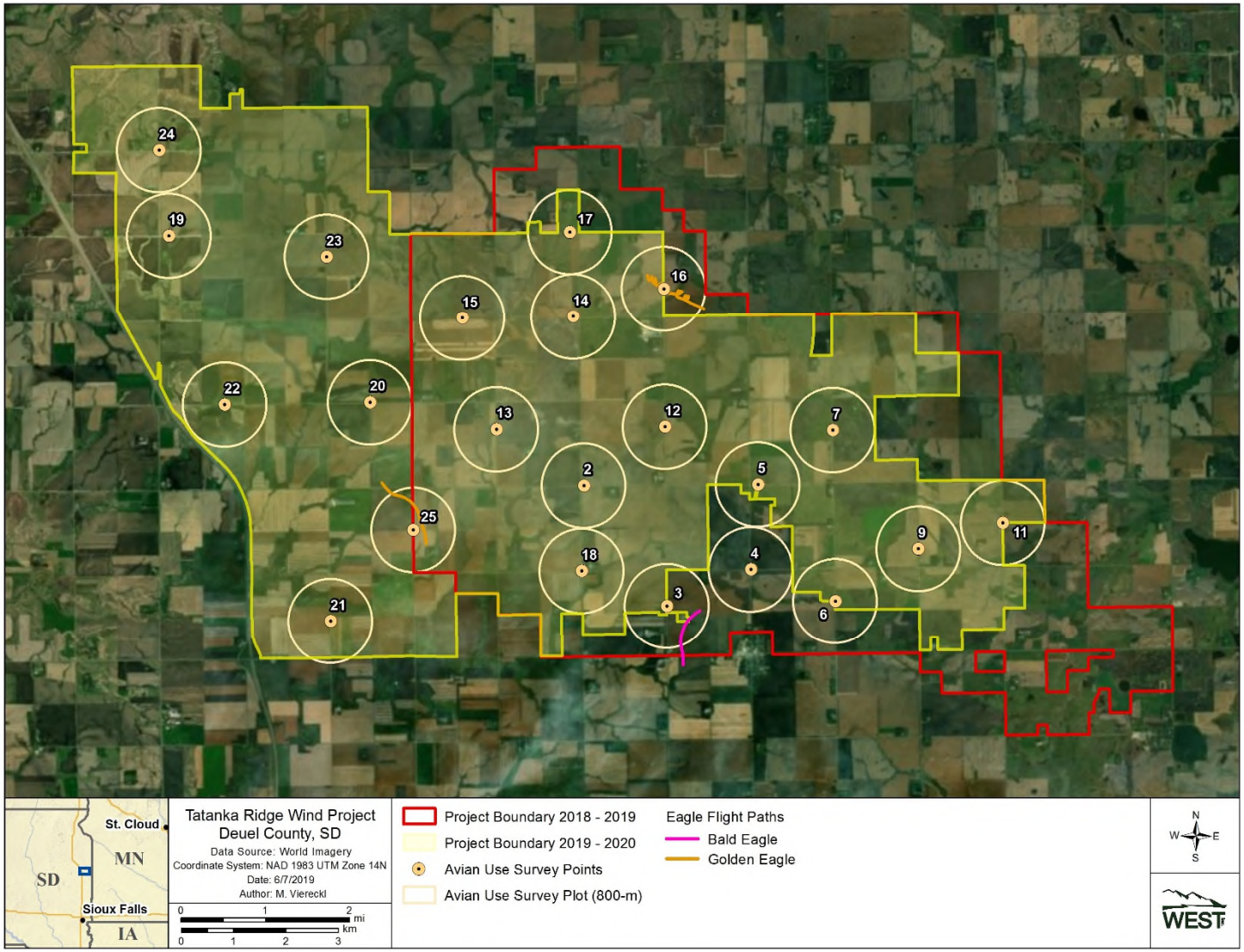


Figure 8. Flight paths for eagles by species observed at the Tatanka Ridge Wind Project from April 20, 2018 – March 26, 2019. Points 19–25 were added in February 2019.

Table 10. Survey effort, eagle observations, and mean eagle use (observations/800-meter plot/60-minute survey) by point at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

		Number of Observations		Number of Eagle Minutes			Mean Eagle Use
Point	Number of 60-minute surveys	Bald Eagles	Golden Eagles	All Bald Eagle Minutes	All Golden Eagle Minutes	Minutes within the Zone of Risk[a] (both species)	Within 800 m at All Heights (both species)
2	12	0	0	0	0	0	0
3	12	1	0	3	0	1	0.0833
4	11	0	0	0	0	0	0
5	12	0	0	0	0	0	0
6	12	0	0	0	0	0	0
7	12	0	0	0	0	0	0
9	12	0	0	0	0	0	0
11	12	0	0	0	0	0	0
12	12	0	0	0	0	0	0
13	12	0	0	0	0	0	0
14	12	1	0	6	0	0	0
15	8	0	0	0	0	0	0
16	10	0	1	0	3	3	0.1000
17	12	0	0	0	0	0	0
18	3	0	0	0	0	0	0
19	2	0	0	0	0	0	0
20	2	0	0	0	0	0	0
21	2	0	0	0	0	0	0
22	2	0	0	0	0	0	0
23	2	0	0	0	0	0	0
24	2	0	0	0	0	0	0
25	2	0	1	0	40	2	0.5
Overall	**178**	**2**	**2**	**9**	**43**	**5**	**0.0165**

[a] Zone of risk is within 800 meters (m) and below 200-m.

Sensitive Species Observations

No federally or state-listed threatened or endangered species were documented at the Project. Nine sensitive species were recorded, totaling 84 observations (Table 11). Bald and golden eagles are protected under the BGEPA and bald eagles are afforded additional protections under the SDWAP; two bald eagle observations and two golden eagle observations were recorded during fixed-point surveys, with no additional observations of either species recorded incidentally.

Three species designated by SDGFP as species of greatest conservation need were recorded at the Project, American white pelican (48 observations), bald eagle (two observations), and trumpeter swan (*Cygnus buccinator*; 15 observations; Table 11). Both bald eagle and American white pelican were documented only during fixed-point counts, while trumpeter swan was primarily observed incidentally. American white pelican was only observed in the spring (Appendix A1). Five species designated as BCC by USFWS within BCR 11 were also observed: upland sandpiper (*Bartramia longicauda*; 10 observations), Swainson's hawk (*Buteo swainsoni;* seven observations), grasshopper sparrow (*Ammodramus savannarum*; five observations), red-headed woodpecker (one observation), and dickcissel (*Spiza Americana*; 46 observations; Table 11). One observation of Swainson's hawk, and one observation of upland sandpiper were documented incidentally, while all other BCC listed species' observations were recorded during fixed-point count surveys (Table 11).

Table 11. Summary of group and individual observations of sensitive species observed at the Tatanka Ridge Wind Project during the fixed-point count avian use surveys (FPC) and as incidental wildlife observations (INC) from April 20, 2018 − March 26, 2019.

			FPC		INC		Total	
Species	**Scientific Name**	**Status**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
bald eagle	*Haliaeetus leucocephalus*	BGEPA, SGCN	2	2	0	0	2	2
golden eagle	*Aquila chrysaetos*	BGEPA	2	2	0	0	2	2
American white pelican	*Pelecanus erythrorhynchos*	SGCN	5	48	0	0	5	48
trumpeter swan	*Cygnus buccinator*	SGCN	1	4	1	11	2	15
Dickcissel	*Spiza americana*	BCC	24	46	0	0	24	46
grasshopper sparrow	*Ammodramus savannarum*	BCC	4	5	0	0	4	5
red-headed woodpecker	*Melanerpes erythrocephalus*	BCC	1	1	0	0	1	1
Swainson's hawk	*Buteo swainsoni*	BCC	4	6	1	1	5	7
upland sandpiper	*Bartramia longicauda*	BCC	8	9	1	1	9	10
Total	**9 species**		**51**	**123**	**3**	**13**	**54**	**136**

BGEPA = Bald and Golden Eagle Protection Act (1940)

BCC= Bird of Conservation Concern within Bird Conservation Region 11 (US Fish and Wildlife Service 2008)

SGCN= Species of Greatest Conservation Need in a restricted range (South Dakota Wildlife Action Plan 2014)

Grps = groups; obs = observations.

Incidental Observations

Eleven species were recorded as incidental observations outside of standard surveys totaling 75 individuals (Table 12). One species, Cooper's hawk (*Accipiter cooperii),* was only recorded incidentally and was not observed during standard surveys (Table 12, Appendix A1).

Table 12. Avian species observed incidentally at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

Species	Scientific Name	# groups	# observations
American kestrel	*Falco sparverius*	3	3
Cooper's hawk	*Accipiter cooperii*	1	1
northern flicker	*Colaptes auratus*	13	16
northern harrier	*Circus hudsonius*	6	6
red-tailed hawk	*Buteo jamaicensis*	26	28
sedge wren	*Cistothorus platensis*	1	1
Swainson's hawk	*Buteo swainsoni*	1	1
trumpeter swan	*Cygnus buccinator*	1	11
turkey vulture	*Cathartes aura*	2	4
unidentified buteo	*Buteo* spp.	3	3
upland sandpiper	*Bartramia longicauda*	1	1
Total	***11 species***	**58**	**75**

DISCUSSION

The avian species observed in the Project area during the study are typical of those commonly found in cultivated agriculture and pasturelands of the region (US Geological Survey 2018). For example, snow geese, the most abundant bird observed during the study (n = 6,310 individuals) are known to migrate in large flocks in the Central Flyway and forage within harvested grain fields (Mowbray et al., 2000). The most abundant passerine, red-winged blackbird (n = 285 individuals), is known to associate with agriculture and can occur in flocks numbering in the thousands (Yasukawa and Searcy, 2019). Grassland species such as western meadowlark (*Sturnella neglecta*; n = 53), savannah sparrow (*Passerculus sandwichensis*; n = 12), and vesper sparrow (*Pooecetes gramineus*; n = 11) were less abundant, reflecting the limited grassland habitat within the Project and surrounding landscape. Overall, the bird community consists primarily of migrant waterfowl, with bird species that use natural landscape features such as grasslands in lower abundance.

Distinct seasonal patterns of avian use were observed for both large and small birds. Large bird use was higher during spring migration than other seasons, which is typical for the Project's location in the Central Flyway (National Audubon Society 2019). High large bird use in spring and fall, and low large bird use in summer and winter, indicate the area is primarily used for migration and that breeding large birds do not occur in high density. Small bird use was highest in spring and summer, indicating the remnant natural habitat provides some functional value for passerines (Fletcher and Koford, 2002).

Spatial variation in mean use among points was detected for large birds with Point 5 having the highest use (494.50 observations/60-min survey), over 10-times the next highest mean use value. Bird species observed at Point 5 were primarily waterfowl, including snow geese. As flocks of waterfowl were observed in flight over Point 5, and not foraging on the ground within the point, it cannot be concluded that the waterfowl were physically using the landscape within the point, and it is uncertain if waterfowl use at this location will be high in subsequent years.

The study was also designed to document eagle use. During the 178 hours of surveys, just two bald eagle and two golden eagle observations were recorded for a total of 52 min of observation (9 minutes of bald eagle observation, and 43 minutes of golden eagle observation), of which just five min occurred in the zone of risk. Eagles were observed in spring, fall, and winter with no records in summer, and each of the observations occurred at different observation points. Due to the low number of observations, spatial and temporal patterns of use are not apparent. Risk to eagle and sensitive species will be analyzed and assessed in a subsequent report upon completion of the 2019−2020 surveys.

During large bird surveys, two bald eagles and two golden eagles were observed. Both species are known to occur in the region (eBird, 2019). The eBird database, housed and managed by the Cornell Lab of Ornithology, is currently the largest compendium of geospatial data on birds in the world, receiving over three million records per month, and providing an unparalleled resource for the analysis of bird distributional patterns over time and space for most of North America (Sullivan et al. 2009). According to eBird data, two golden eagle and 26 bald eagle observations were recorded in Deuel County since 2014 (eBird 2019). These data confirm that the low densities of eagles observed at the Project are consistent with typical distributions of these species in the region.

Risk Analysis

Wind energy facilities can directly and indirectly impact wildlife resources. Direct impacts include fatalities from facility construction and operation, and habitat loss and fragmentation from infrastructure placement (Erikson et al., 2014). Indirect impacts are not well studied, and may include displacement away from wind turbines (Stevens et al., 2013) These baseline Tier 3 studies provided site-specific data that, when combined with available literature, allow for a better-informed assessment of the potential impacts to avian species within the Project

Publicly available fatality rate data for avian species (bird fatalities per megawatt [MW] per year) are available for 37 studies from facilities in the Midwest (Appendix E). Passerine species are the most common fatality reported by publicly available wind-energy facility studies in the Midwest (54.8% of 1,811 fatalities; Appendix E1). For all avian species combined, fatality rates ranged from zero to 8.25 fatalities/MW/year, and averaged 2.74 fatalities/MW/year for these facilities (Appendix E2). The annual fatality rate is much lower when looking at raptors alone, where the fatality rate range is between zero and 0.47 fatality/MW/year, and averages 0.07 fatalities/MW/year (Appendix E2). Raptor use estimates and a resulting risk analyses for the Project will be developed at the completion of the 2019-2020 surveys currently in progress.

REFERENCES

ARCADIS U.S., Inc. 2013. Fall 2012 and Spring 2013 Avian and Bat Post-Construction Mortality Monitoring Report: Pioneer Trail Wind Farm. Prepared for E.On Climate & Renewables, North America. Prepared by ARCADIS U.S., Inc., Milwaukee, Wisconsin. August 2013.

Bald and Golden Eagle Protection Act (Eagle Act). 1940. 16 United States Code (USC) § 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, § 2, 54 Statute (Stat.) 251; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. As amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.

BHE Environmental, Inc. (BHE). 2010. Post-Construction Bird and Bat Mortality Study: Cedar Ridge Wind Farm, Fond Du Lac County, Wisconsin. Interim Report prepared for Wisconsin Power and Light, Madison, Wisconsin. Prepared by BHE Environmental, Inc. Cincinnati, Ohio. February 2010.

BHE Environmental, Inc. (BHE). 2011. Post-Construction Bird and Bat Mortality Study: Cedar Ridge Wind Farm, Fond Du Lac County, Wisconsin. Final Report. Prepared for Wisconsin Power and Light, Madison, Wisconsin. Prepared by BHE Environmental, Inc. Cincinnati, Ohio. February 2011.

Chodachek, K., C. Derby, M. Sonnenberg, and T. Thorn. 2012. Post-Construction Fatality Surveys for the Pioneer Prairie Wind Farm I LLC Phase II, Mitchell County, Iowa: April 4, 2011 – March 31, 2012. Prepared for EDP Renewables, North America LLC, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 27, 2012.

Chodachek, K., C. Derby, K. Adachi, and T. Thorn. 2014. Post-Construction Fatality Surveys for the Pioneer Prairie II Wind Energy Facility, Mitchell County, Iowa. Final Report: July 1 - October 18, 2013. Prepared for EDP Renewables, North America LLC, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. April 2014.

Chodachek, K., K. Adachi, and G. DiDonato. 2015. Post Construction Fatality Surveys for the Prairie Rose Wind Energy Facility, Rock County, Minnesota. Final Report: April 15 to June 13, 2014, and August 15 to October 29, 2014. Prepared for Enel Green Power, North America, San Diego, California. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. January 23, 2015. Available online: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BF38C2FEC-ED84-4813-AF3E-5A397A954A34%7D&documentTitle=20152-107006-01

Chodachek, K. and Z. Gustafson. 2018. Tier 4 Post-Construction Mortality Monitoring Study for the Odell Wind Energy Project, Cottonwood and Jackson Counties, Minnesota. Final Fatality Report: December 2016 – December 2017. Prepared for Odell Wind Farm, LLC, Oakville, Ontario, Canada. Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. March 15, 2018. Available online: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={E0912A62-0000-C93E-88EA-844E240F695B}&documentTitle=20183-141067-02

Derby, C., A. Dahl, W. Erickson, K. Bay, and J. Hoban. 2007. Post-Construction Monitoring Report for Avian and Bat Mortality at the Nppd Ainsworth Wind Farm. Prepared for the for the Nebraska Public Power District, Columbus, Nebraska. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. February 27, 2007. Available online: https://tethys.pnnl.gov/sites/default/files/publications/Avian%20&%20Bat%20Mortiality%20at%20the%20NPPD%20Ainsworth%20Wind%20Farm.pdf

Derby, C., J. Ritzert, and K. Bay. 2010a. Bird and Bat Fatality Study, Grand Ridge Wind Resource Area, Lasalle County, Illinois. January 2009 - January 2010. Prepared for Grand Ridge Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. July 13, 2010. Revised January 2011.

Derby, C., K. Chodachek, and K. Bay. 2010b. Post-Construction Bat and Bird Fatality Study Crystal Lake II Wind Energy Center, Hancock and Winnebago Counties, Iowa. Final Report: April 2009- October 2009. Prepared for NextEra Energy Resources, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. June 2, 2010.

Derby, C., A. Dahl, A. Merrill, and K. Bay. 2010c. 2009 Post-Construction Monitoring Results for the Wessington Springs Wind-Energy Facility, South Dakota. Final Report. Prepared for Wessington Wind Energy Center, LLC, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 19, 2010.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010d. Post-Construction Fatality Survey for the Buffalo Ridge I Wind Project. May 2009 - May 2010. Prepared for Iberdrola Renewables, Inc., Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010e. Post-Construction Fatality Surveys for the Elm Creek Wind Project: March 2009- February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010f. Post-Construction Fatality Surveys for the Moraine II Wind Project: March - December 2009. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., A. Dahl, K. Bay, and L. McManus. 2011a. 2010 Post-Construction Monitoring Results for the Wessington Springs Wind Energy Facility, South Dakota. Final Report: March 9 – November 16, 2010. Prepared for Wessington Wind Energy Center, LLC, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. November 22, 2011.

Derby, C., K. Chodachek, K. Bay, and S. Nomani. 2011b. Post-Construction Fatality Surveys for the Barton I and II Wind Project: Iri. March 2010 - February 2011. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. Version: September 28, 2011.

Derby, C., K. Chodachek, K. Bay, and S. Nomani. 2011c. Post-Construction Fatality Surveys for the Rugby Wind Project: Iberdrola Renewables, Inc. March 2010 - March 2011. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. Version: October 14, 2011.

Derby, C., K. Chodachek, T. Thorn, K. Bay, and S. Nomani. 2011d. Post-Construction Fatality Surveys for the Prairiewinds Nd1 Wind Facility, Basin Electric Power Cooperative, March - November 2010. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 2, 2011.

Derby, C., K. Chodachek, and M. Sonnenberg. 2012a. Post-Construction Casualty Surveys for the Buffalo Ridge II Wind Project. Iberdrola Renewables: March 2011- February 2012. Prepared for Iberdrola Renewables, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 31, 2012.

Derby, C., K. Chodachek, and M. Sonnenberg. 2012b. Post-Construction Fatality Surveys for the Elm Creek II Wind Project. Iberdrola Renewables: March 2011-February 2012. Prepared for Iberdrola Renewables, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. October 8, 2012.

Derby, C., A. Dahl, and A. Merrill. 2012c. Post-Construction Monitoring Results for the Prairiewinds Sd1 Wind Energy Facility, South Dakota. Final Report: March 2011 - February 2012. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 27, 2012.

Derby, C., K. Chodachek, T. Thorn, and A. Merrill. 2012d. Post-Construction Surveys for the Prairiewinds Nd1 (2011) Wind Facility Basin Electric Power Cooperative: March - October 2011. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western Ecosystems Technology, Inc. (WEST), Bismarck, North Dakota. August 31, 2012.

Derby, C., A. Dahl, and D. Fox. 2013. Post-Construction Fatality Monitoring Studies for the Prairiewinds Sd1 Wind Energy Facility, South Dakota. Final Report: March 2012 - February 2013. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. November 13, 2013.

Derby, C., A. Dahl, and G. DiDonato. 2014. Post-Construction Fatality Monitoring Studies for the Prairiewinds Sd1 Wind Energy Facility, South Dakota. Final Report: March 2013 - February 2014. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., D. Klostermeier, R. Tupling, and K. Moratz. 2018. Post-Construction Bird and Bat Fatality Monitoring for the Thunder Spirit Wind Energy Facility, Adams County, North Dakota. Final Fatality Report. Prepared for Thunder Spirit Wind, LLC, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. March 1, 2018.

eBird. 2019. Ebird: An Online Database of Bird Distribution and Abundance. eBird, Cornell Lab of Ornithology, Ithaca, New York. Accessed June 2019. Available online at: http://ebird.org/content/ebird/

Endangered Species Act (ESA). 1973. 16 United States Code (USC) §§ 1531-1544, Public Law (PL) 93-205, December 28, 1973, as amended, PL 100-478 [16 USC 1531 *et seq.*]; 50 Code of Federal Regulations (CFR) 402.

Erickson WP, Wolfe MM, Bay KJ, Johnson DH, Gehring JL (2014) A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi:10.1371/journal.pone.0107491

ESRI. 2019. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (ESRI), producers of ArcGIS software. Redlands, California. Information online: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

Fagen Engineering, LLC. 2014. 2013 Avian and Bat Monitoring Annual Report: Big Blue Wind Farm, Blue Earth, Minnesota. Prepared for Big Blue Wind Farm. Prepared by Fagen Engineering, LLC. May 2014.

Fagen Engineering, LLC. 2015. 2014 Avian and Bat Monitoring Annual Report: Big Blue Wind Farm, Blue Earth, Minnesota. Prepared for Big Blue Wind Farm. Prepared by Fagen Engineering, LLC.

Fletcher, R.J., R.R. Koford. 2002 Habitat and Landscape Associations of Breeding Birds in Native and Restored Grasslands. The Journal of Wildlife Management. Vol. 66, No. 4 (Oct., 2002), pp. 1011-1022

Golder Associates. 2010. Report on Fall Post-Construction Monitoring, Ripley Wind Power Project, Acciona Wind. Report Number 09-1126-0029. Submitted to Suncor Energy Products Inc., Calgary, Alberta, and Acciona Wind Energy Canada, Toronto, Ontario. February 2010.

Good, R. E., W. P. Erickson, A. Merrill, S. Simon, K. Murray, K. Bay, and C. Fritchman. 2011. Bat Monitoring Studies at the Fowler Ridge Wind Energy Facility, Benton County, Indiana: April 13 - October 15, 2010. Prepared for Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. January 28, 2011. Available online: https://www.fws.gov/midwest/endangered/permits/hcp/FowlerRidge/pdf/AppendixA_FowlerRidgeWindFarmFinalHCP062713.pdf

Good, R. E., A. Merrill, S. Simon, K. Murray, and K. Bay. 2012. Bat Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: April 1 - October 31, 2011. Prepared for the Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 31, 2012. Available online: http://batsandwind.org/pdf/Good%20et%20al.%202012_Fowler%20Report.pdf

Good, R. E., M. Sonnenburg, and S. Simon. 2013a. Bat Evaluation Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: August 1 - October 15, 2012. Prepared for the Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 31, 2013.

Good, R. E., M. L. Ritzert, and K. Adachi. 2013b. Post-Construction Monitoring at the Rail Splitter Wind Farm, Tazwell and Logan Counties, Illinois. Final Report: May 2012 - May 2013. Prepared for EDP Renewables, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. December 16, 2013.

Good, R. E., J. P. Ritzert, and K. Adachi. 2013c. Post-Construction Monitoring at the Top Crop Wind Farm, Gundy and Lasalle Counties, Illinois. Final Report: May 2012 - May 2013. Prepared for EDP Renewables, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. December 13, 2013.

Good, R. E., S. Simon, and S. Howlin. 2014. Post-Construction Monitoring Research on Turbine Operational Protocols, Temperature, and Bat Mortality at the Bishop Hill Wind Energy Facility, Henry County, Illinois. Permit No. TE71464A-0. August 1 - September 30, 2013. Prepared for Bishop Hill Energy, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 31, 2014.

Good, R. E., G. Iskali, and K. Nasman. 2016. Bat Evaluation Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: August 3 - October 14, 2015. Prepared for Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 28, 2016. Available online: https://www.fws.gov/midwest/endangered/permits/hcp/FowlerRidge/pdf/MonitoringReport2015FowlerHCP28Jan2015.pdf

Good, R. E., A. Ciecka, G. Iskali, and K. Nasman. 2017. Bat Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: August 3 - October 12, 2016. Draft. Prepared for Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 31, 2017. Available online: https://www.fws.gov/midwest/endangered/permits/hcp/FowlerRidge/pdf/MonitoringReportFowler2016Dated013117.pdf

Good, R. E., G. Iskali, K. Nasman, and A. Ciecka. 2018. Bat Evaluation Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: August 1 - October 15, 2017. Prepared for Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. January 29, 2018. Available online: https://www.fws.gov/midwest/endangered/permits/hcp/FowlerRidge/pdf/Fowler2017ReportDraft012918v2.pdf

Grodsky, S. M. and D. Drake. 2011. Assessing Bird and Bat Mortality at the Forward Energy Center. Final Report. Public Service Commission (PSC) of Wisconsin. PSC REF#:152052. Prepared for Forward Energy LLC. Prepared by Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, Madison, Wisconsin. August 2011.

Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, Wisconsin July 21 - October 31, 2008 and March 15 - June 4, 2009. Unpublished report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 17, 2009.

Homer, C. G., J. A. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. D. Herold, J. D. Wickham, and K. Megown. 2015. Completion of the 2011 National Land Cover Database for the Conterminous United States-Representing a Decade of Land Cover Change Information. Photogrammetric Engineering and Remote Sensing 81(5): 345-354. Available online: http://www.mrlc.gov/nlcd2011.php

Howe, R. W., W. Evans, and A. T. Wolf. 2002. Effects of Wind Turbines on Birds and Bats in Northeastern Wisconsin. Prepared by University of Wisconsin-Green Bay, for Wisconsin Public Service Corporation and Madison Gas and Electric Company, Madison, Wisconsin. November 21, 2002. 104 pp.

Jacques Whitford Stantec Limited (Jacques Whitford). 2009. Ripley Wind Power Project Postconstruction Monitoring Report. Project No. 1037529.01. Report to Suncor Energy Products Inc., Calgary, Alberta, and Acciona Energy Products Inc., Calgary, Alberta. Prepared for the Ripley Wind Power Project Post-Construction Monitoring Program. Prepared by Jacques Whitford, Markham, Ontario. April 30, 2009.

Jain, A. 2005. Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm. Thesis. Iowa State University, Ames, Iowa. Available online: http://batsandwind.org/pdf/Jain_2005.pdf

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Final Report: Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp.

Johnson, G. D., M. K. Perlik, W. P. Erickson, and M. D. Strickland. 2004. Bat Activity, Composition and Collision Mortality at a Large Wind Plant in Minnesota. Wildlife Society Bulletin 32(4): 1278-1288.

Johnson, G. D., M. Ritzert, S. Nomani, and K. Bay. 2010a. Bird and Bat Fatality Studies, Fowler Ridge I Wind-Energy Facility Benton County, Indiana. Unpublished report prepared for British Petroleum Wind Energy North America Inc. (BPWENA) by Western EcoSystems Technology, Inc. (WEST).

Johnson, G. D., M. Ritzert, S. Nomani, and K. Bay. 2010b. Bird and Bat Fatality Studies, Fowler Ridge III Wind-Energy Facility, Benton County, Indiana. April 2 - June 10, 2009. Prepared for BP Wind Energy North America. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

Kerlinger, P., R. Curry, A. Hasch, and J. Guarnaccia. 2007. Migratory Bird and Bat Monitoring Study at the Crescent Ridge Wind Power Project, Bureau County, Illinois: September 2005 - August 2006. Final draft prepared for Orrick Herrington and Sutcliffe, LLP. May 2007.

Kerlinger, P., J. Guarnaccia, R. Curry, and C. J. Vogel. 2014. Bird and Bat Fatality Study, Heritage Garden I Wind Farm, Delta County, Michigan: 2012-2014. Prepared for Heritage Sustainable Energy, LLC. Prepared by Curry and Kerlinger, LLC, McLean, Virginia. November 2014.

Krenz, J. D. and B. R. McMillan. 2000. Final Report: Wind-Turbine Related Bat Mortality in Southwestern Minnesota. Minnesota Department of Natural Resources, St. Paul, Minnesota. Available online: http://files.dnr.state.mn.us/eco/nongame/projects/consgrant_reports/2000/2000_krenz_mcmillan.pdf

Migratory Bird Treaty Act (MBTA). 1918. 16 United States Code (USC) §§ 703-712. July 13, 1918.

Minnesota Public Utilities Commission (MPUC). 2012. Lakefield Wind Project Avian and Bat Fatality Monitoring. MPUC Site Permit Quarterly Report and USFWS Special Purpose – Utility (Avian Take Monitoring) 30-Day Report: April 1 – September 30, 2012. USFWS Permit No: MB70161A-0; MDNR Permit No: 17930; MPUC Permit No: IP-6829/WS-09-1239, Permit Special Condition VII.B. October 15, 2012.

Mowbray, T. B., F. Cooke, and B. Ganter (2000). Snow Goose (*Anser caerulescens*), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.514

National Audubon Society (Audubon). 2019. The Flyways: Central Flyway. Accessed May 2019. Available online: https://www.audubon.org/central-flyway

Natural Resource Solutions Inc. (NRSI). 2008. 2007 Bird and Bat Mortality Monitoring, Prince Wind Power Project. Project No. 723. Prepared for Brookfield Renewable Power, Gatineau, Quebec. Prepared by NSRI, Waterloo, Ontario. February 2008.

Natural Resource Solutions Inc. (NRSI). 2009. 2006, 2007 and 2008 Bird and Bat Mortality Monitoring, Prince Wind Power Project. Project No. 821, D. Stephenson, Senior Biologist. Prepared for Brookfield Renewable Power, Gatineau, Quebec. Prepared by NSRI, Waterloo, Ontario. May 5, 2009.

Natural Resource Solutions Inc. (NRSI). 2011. Harrow Wind Farm 2010 Post-Construction Monitoring Report. Project No. 0953. Prepared for International Power Canada, Inc., Markham, Ontario. Prepared by NRSI, Waterloo, Ontario. August 2011.

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Osborn, R. G., K. F. Higgins, C. D. Dieter, and R. E. Usgaard. 1996. Bat Collisions with Wind Turbines in Southwestern Minnesota. Bat Research News 37: 105-108.

Osborn, R. G., K. F. Higgins, R. E. Usgaard, C. D. Dieter, and R. G. Neiger. 2000. Bird Mortality Associated with Wind Turbines at the Buffalo Ridge Wind Resource Area, Minnesota. American Midland Naturalist 143: 41-52.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82(3): 309-313.

South Dakota Department of Game, Fish and Parks (SDGFP). 2014. South Dakota Wildlife Action Plan. SDGFP, Pierre, South Dakota. Available online at: http://gfp.sd.gov/images/WebMaps/Viewer/WAP/Website/PlanSections/SD%20Wildlife%20Action%20Plan%20Revision%20Final.pdf

Stantec Consulting Ltd. (Stantec Ltd.). 2008. Melancthon I Wind Plant Post-Construction Bird and Bat Monitoring Report: 2007. File No. 160960220. Prepared for Canadian Hydro Developers, Inc., Guelph, Ontario. Prepared by Stantec Ltd., Guelph, Ontario. June 2008.

Stevens, T.K., Hale, A.M., Karsten, K.B. et al. Biodivers Conserv (2013) 22: 1755. https://doi.org/10.1007/s10531-013-0510-8

Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. Biological Conservation 142: 2282-2292

Tetra Tech. 2017a. 2016-2017 Post-Construction Fatality Monitoring Annual Report: Waverly Wind Farm, Coffey County, Kansas. Prepared for Waverly Wind Farm, LLC. Prepared by Portland, Oregon. October 2017.

Tetra Tech. 2017b. 2016 - 2017 Post-Construction Mortality Monitoring Annual Report, Pleasant Valley Wind Farm, Mower and Dodge Counties, Minnesota. Prepared for Northern States Power Company-Minnesota, Xcel Energy. Prepared by Tetra Tech, Bloomington, Minnesota. June 2017. Available online: https://mn.gov/commerce/energyfacilities/Docket.html?Id=25724

US Environmental Protection Agency (USEPA). 2016. Level III and Level IV Ecoregions of the Continental United States. Last updated on March 22, 2016. Available online: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states

US Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. December 2008. Division of Migratory Bird Management, Arlington, Virginia. Available online: https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

US Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. 103 pp. + frontmatter. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

US Fish and Wildlife Service (USFWS). 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests; Final Rule. 50 CFR 13 and 22. Department of the Interior Fish and Wildlife Service. 81 Federal Register (FR) 242: 91494-91554. December 16, 2016.

US Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (NLCD 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Available online: http://www.mrlc.gov/nlcd2011.php; Legend: http://www.mrlc.gov/nlcd11_leg.php

US Geological Survey (USGS) Patuxent Wildlife Research Center (PWRC). 2018. North American Breeding Bird Survey Internet Data Set. Provisional data through 2017. Accessed December 2018. Available online: https://www.pwrc.usgs.gov/BBS/PublicDataInterface/index.cfm

Yasukawa, K. and W. A. Searcy (2019). Red-winged Blackbird (*Agelaius phoeniceus*), version 2.0. In The Birds of North America (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.rewbla.02

Appendix A. All Bird Types and Species Observed at the Tatanka Ridge Wind Project during Fixed-Point Avian Use Surveys from April 20, 2018 to March 26, 2019.

Appendix A1. Summary of individuals and group observations[a] by bird type and species for 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**2**	**2**	**8**	**51**	**1**	**50**	**0**	**0**	**11**	**103**
great egret	*Ardea alba*	0	0	2	2	0	0	0	0	2	2
great blue heron	*Ardea. herodias*	2	2	1	1	0	0	0	0	3	3
American white pelican	*Pelecanus erythrorhynchos*	0	0	5	48	0	0	0	0	5	48
double-crested cormorant	*Phalacrocorax auritus*	0	0	0	0	1	50	0	0	1	50
Waterfowl		**75**	**6,939**	**11**	**38**	**6**	**69**	**0**	**0**	**92**	**7,046**
wood duck	*Aix sponsa*	2	4	0	0	0	0	0	0	2	4
northern pintail	*Anas acuta*	1	7	0	0	0	0	0	0	1	7
northern shoveler	*Spatula clypeata*	2	15	0	0	0	0	0	0	2	15
blue-winged teal	*Spatula discors*	3	9	0	0	0	0	0	0	3	9
mallard	*Anas platyrhynchos*	22	40	8	13	0	0	0	0	30	53
gadwall	*Mareca strepera*	2	6	0	0	0	0	0	0	2	6
greater white-fronted goose	*Anser albifrons*	4	291	0	0	0	0	0	0	4	291
Canada goose	*Branta canadensis*	28	222	0	0	5	39	0	0	33	261
snow goose	*Anser caerulescens*	8	6,310	0	0	0	0	0	0	8	6,310
trumpeter swan	*Cygnus buccinator*	1	4	0	0	0	0	0	0	1	4
common merganser	*Mergus merganser*	1	7	0	0	0	0	0	0	1	7
unidentified duck		1	24	3	25	0	0	0	0	4	49
unidentified goose		0	0	0	0	1	30	0	0	1	30
Shorebirds		**31**	**39**	**45**	**72**	**4**	**11**	**0**	**0**	**80**	**122**
upland sandpiper	*Bartramia longicauda*	2	2	6	7	0	0	0	0	8	9
killdeer	*Charadrius vociferus*	26	34	35	61	3	10	0	0	64	105
Wilson's snipe	*Gallinago delicata*	3	3	3	3	0	0	0	0	6	6
unidentified yellowlegs	*Tringa* spp.	0	0	1	1	0	0	0	0	1	1
unidentified shorebird		0	0	0	0	1	1	0	0	1	1
Gulls/Terns		**0**	**0**	**1**	**1**	**10**	**582**	**0**	**0**	**11**	**583**
ring-billed gull	*Larus delawarensis*	0	0	0	0	1	1	0	0	1	1
Franklin's gull	*Leucophaeus pipixcan*	0	0	1	1	8	541	0	0	9	542
unidentified gull		0	0	0	0	1	40	0	0	1	40
Diurnal Raptors		**14**	**15**	**11**	**12**	**45**	**50**	**1**	**1**	**71**	**78**
Accipiters		0	0	0	0	2	2	0	0	2	2
sharp-shinned hawk	*Accipiter striatus*	0	0	0	0	2	2	0	0	2	2

Appendix A1. Summary of individuals and group observations[a] by bird type and species for 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Buteos		11	12	10	11	25	29	0	0	46	52
red-tailed hawk	*Buteo jamaicensis*	9	10	6	7	22	24	0	0	37	41
rough-legged hawk	*Buteo lagopus*	1	1	0	0	1	1	0	0	2	2
unidentified buteo	*Buteo* spp.	0	0	2	2	1	1	0	0	3	3
Swainson's hawk	*Buteo swainsoni*	1	1	2	2	1	3	0	0	4	6
Northern Harrier		1	1	1	1	10	11	0	0	12	13
northern harrier	*Circus hudsonius*	1	1	1	1	10	11	0	0	12	13
Eagles		2	2	0	0	1	1	1	1	4	4
golden eagle	*Aquila chrysaetos*	1	1	0	0	1	1	0	0	2	2
bald eagle	*Haliaeetus leucocephalus*	1	1	0	0	0	0	1	1	2	2
Falcons		0	0	0	0	5	5	0	0	5	5
merlin	*Falco columbarius*	0	0	0	0	1	1	0	0	1	1
American kestrel	*Falco sparverius*	0	0	0	0	3	3	0	0	3	3
unidentified falcon	*Falco* spp.	0	0	0	0	1	1	0	0	1	1
Other Raptors		0	0	0	0	2	2	0	0	2	2
unidentified raptor		0	0	0	0	2	2	0	0	2	2
Vultures		**4**	**9**	**2**	**2**	**5**	**5**	**0**	**0**	**11**	**16**
turkey vulture	*Cathartes aura*	4	9	2	2	5	5	0	0	11	16
Upland Game Birds		**23**	**28**	**25**	**26**	**6**	**7**	**9**	**53**	**63**	**114**
wild turkey	*Meleagris gallopavo*	0	0	1	1	0	0	0	0	1	1
ring-necked pheasant	*Phasianus colchicus*	23	28	24	25	6	7	9	53	62	113
Doves/Pigeons		**13**	**30**	**47**	**66**	**18**	**83**	**15**	**71**	**93**	**250**
rock pigeon	*Columba livia*	5	18	5	9	10	72	14	70	34	169
Eurasian collared-dove	*Streptopelia decaocto*	0	0	1	1	0	0	1	1	2	2
mourning dove	*Zenaida macroura*	8	12	41	56	8	11	0	0	57	79
Large Corvids		**20**	**69**	**2**	**2**	**11**	**34**	**5**	**7**	**38**	**112**
American crow	*Corvus brachyrhynchos*	20	69	2	2	11	34	5	7	38	112
Overall		**182**	**7,131**	**152**	**270**	**106**	**891**	**30**	**132**	**470**	**8,424**

[a] Regardless of distance from observer.

Appendix A2. Summary of individuals and group observations[a] by bird type and species for 10-minute fixed-point small bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota April 20, 2018 − March 26, 2019.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**128**	**508**	**256**	**432**	**58**	**185**	**8**	**118**	**450**	**1,243**
Passerines(Subtype)		2	2	16	22	18	36	0	0	36	60
unidentified passerine		2	2	16	22	18	36	0	0	36	60
Blackbirds/Orioles		69	263	75	132	20	114	0	0	164	509
red-winged blackbird	*Agelaius phoeniceus*	25	184	22	30	3	71	0	0	50	285
bobolink	*Dolichonyx oryzivorus*	4	7	9	16	0	0	0	0	13	23
Brewer's blackbird	*Euphagus cyanocephalus*	0	0	2	18	0	0	0	0	2	18
brown-headed cowbird	*Molothrus ater*	12	29	14	26	0	0	0	0	26	55
common grackle	*Quiscalus quiscula*	10	11	10	14	3	3	0	0	23	28
western meadowlark	*Sturnella neglecta*	10	15	17	27	6	11	0	0	33	53
European starling	*Sturnus vulgaris*	6	11	0	0	2	3	0	0	8	14
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	1	4	0	0	0	0	0	0	1	4
unidentified blackbird		1	2	1	1	6	26	0	0	8	29
Finches/Crossbills		4	6	19	19	5	8	0	0	28	33
American goldfinch	*Spinus tristis*	4	6	19	19	5	8	0	0	28	33
Flycatchers		1	2	6	8	0	0	0	0	7	10
eastern kingbird	*Tyrannus tyrannus*	1	2	6	8	0	0	0	0	7	10
Grassland/Sparrows		45	221	82	124	10	21	7	116	144	482
Henslow's sparrow	*Ammodramus henslowii*	0	0	1	1	0	0	0	0	1	1
grasshopper sparrow	*Ammodramus savannarum*	1	1	3	4	0	0	0	0	4	5
Lapland longspur	*Calcarius lapponicus*	10	170	0	0	0	0	0	0	10	170
unidentified longspur	*Calcarius* spp.	1	1	0	0	0	0	0	0	1	1
horned lark	*Eremophila alpestris*	17	27	7	11	6	12	7	116	37	166
song sparrow	*Melospiza melodia*	3	3	15	21	1	1	0	0	19	25
house sparrow	*Passer domesticus*	1	2	1	1	0	0	0	0	2	3
savannah sparrow	*Passerculus sandwichensis*	4	5	5	7	0	0	0	0	9	12
vesper sparrow	*Pooecetes gramineus*	2	3	8	8	0	0	0	0	10	11
dickcissel	*Spiza americana*	1	1	23	45	0	0	0	0	24	46
clay-colored sparrow	*Spizella pallida*	3	4	10	13	0	0	0	0	13	17
chipping sparrow	*Spizella passerina*	1	1	3	5	0	0	0	0	4	6
American tree sparrow	*Spizelloides arborea*	0	0	0	0	2	6	0	0	2	6
unidentified sparrow		1	3	6	8	1	2	0	0	8	13
Mimids		0	0	1	1	0	0	0	0	1	1
brown thrasher	*Toxostoma rufum*	0	0	1	1	0	0	0	0	1	1

Appendix A2. Summary of individuals and group observations[a] by bird type and species for 10-minute fixed-point small bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota April 20, 2018 − March 26, 2019.

		Spring		Summer		Fall		Winter		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Swallows		2	7	32	93	1	2	0	0	35	102
barn swallow	*Hirundo rustica*	2	7	15	48	1	2	0	0	18	57
cliff swallow	*Petrochelidon pyrrhonota*	0	0	12	38	0	0	0	0	12	38
northern rough-winged swallow	*Stelgidopteryx serripennis*	0	0	1	2	0	0	0	0	1	2
unidentified swallow		0	0	4	5	0	0	0	0	4	5
Thrushes		2	3	6	8	1	1	0	0	9	12
American robin	*Turdus migratorius*	2	3	6	8	1	1	0	0	9	12
Warblers		3	4	5	6	0	0	0	0	8	10
common yellowthroat	*Geothlypis trichas*	3	4	5	6	0	0	0	0	8	10
Wrens		0	0	14	19	0	0	0	0	14	19
sedge wren	*Cistothorus platensis*	0	0	14	19	0	0	0	0	14	19
Corvids		0	0	0	0	3	3	1	2	4	5
blue jay	*Cyanocitta cristata*	0	0	0	0	3	3	1	2	4	5
Woodpeckers		**1**	**1**	**2**	**2**	**2**	**2**	**0**	**0**	**5**	**5**
northern flicker	*Colaptes auratus*	0	0	0	0	1	1	0	0	1	1
red-headed woodpecker	*Melanerpes erythrocephalus*	0	0	1	1	0	0	0	0	1	1
downy woodpecker	*Dryobates pubescens*	1	1	1	1	0	0	0	0	2	2
hairy woodpecker	*Dryobates villosus*	0	0	0	0	1	1	0	0	1	1
Overall		**129**	**509**	**258**	**434**	**60**	**187**	**8**	**118**	**455**	**1,248**

[a] Regardless of distance from observer.

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Tatanka Ridge Wind Project from April 20, 2018 to March 26, 2019.

Appendix B1. Mean large bird use (number of large observations/800-meter plot/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point large bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Waterbirds	**0.04**	**1.21**	**1.19**	**0**	**<0.1**	**18.9**	**5.6**	**0**	**4.0**	**14.3**	**2.4**	**0**
great egret	0	0.05	0	0	0	0.7	0	0	0	4.8	0	0
great blue heron	0.04	0.02	0	0	<0.1	0.4	0	0	4.0	2.4	0	0
American white pelican	0	1.14	0	0	0	17.8	0	0	0	7.1	0	0
double-crested cormorant	0	0	1.19	0	0	0	5.6	0	0	0	2.4	0
Waterfowl	**117.21**	**0.90**	**1.64**	**0**	**96.8**	**14.1**	**7.7**	**0**	**45.0**	**21.4**	**9.5**	**0**
wood duck	0.10	0	0	0	<0.1	0	0	0	2.4	0	0	0
northern pintail	0.17	0	0	0	0.1	0	0	0	2.4	0	0	0
northern shoveler	0.36	0	0	0	0.3	0	0	0	2.4	0	0	0
blue-winged teal	0.21	0	0	0	0.2	0	0	0	4.8	0	0	0
mallard	0.87	0.31	0	0	0.7	4.8	0	0	24.8	16.7	0	0
gadwall	0.14	0	0	0	0.1	0	0	0	2.4	0	0	0
greater white-fronted goose	4.85	0	0	0	4.0	0	0	0	5.0	0	0	0
Canada goose	4.20	0	0.93	0	3.5	0	4.4	0	17.1	0	7.1	0
snow goose	105.70	0	0	0	87.3	0	0	0	7.4	0	0	0
trumpeter swan	0.10	0	0	0	<0.1	0	0	0	2.4	0	0	0
common merganser	0.12	0	0	0	<0.1	0	0	0	1.7	0	0	0
unidentified duck	0.40	0.60	0	0	0.3	9.3	0	0	1.7	7.1	0	0
unidentified goose	0	0	0.71	0	0	0	3.4	0	0	0	2.4	0
Shorebirds	**0.89**	**1.71**	**0.26**	**0**	**0.7**	**26.7**	**1.2**	**0**	**32.9**	**57.1**	**7.1**	**0**
upland sandpiper	0.05	0.17	0	0	<0.1	2.6	0	0	4.8	9.5	0	0
killdeer	0.77	1.45	0.24	0	0.6	22.6	1.1	0	32.9	57.1	4.8	0
Wilson's snipe	0.07	0.07	0	0	<0.1	1.1	0	0	7.1	7.1	0	0
unidentified yellowlegs	0	0.02	0	0	0	0.4	0	0	0	2.4	0	0
unidentified shorebird	0	0	0.02	0	0	0	0.1	0	0	0	2.4	0
Gulls/Terns	**0**	**0.02**	**13.86**	**0**	**0**	**0.4**	**65.3**	**0**	**0**	**2.4**	**14.3**	**0**
ring-billed gull	0	0	0.02	0	0	0	0.1	0	0	0	2.4	0
Franklin's gull	0	0.02	12.88	0	0	0.4	60.7	0	0	2.4	11.9	0
unidentified gull	0	0	0.95	0	0	0	4.5	0	0	0	2.4	0
Diurnal Raptors	**0.32**	**0.29**	**1.19**	**0.03**	**0.3**	**4.4**	**5.6**	**1.0**	**24.8**	**21.4**	**47.6**	**2.6**
Accipiters	0	0	0.05	0	0	0	0.2	0	0	0	4.8	0
sharp-shinned hawk	0	0	0.05	0	0	0	0.2	0	0	0	4.8	0

Appendix B1. Mean large bird use (number of large observations/800-meter plot/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point large bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Buteos	0.28	0.26	0.69	0	0.2	4.1	3.3	0	23.1	19.0	31.0	0
red-tailed hawk	0.23	0.17	0.57	0	0.2	2.6	2.7	0	18.3	14.3	28.6	0
rough-legged hawk	0.02	0	0.02	0	<0.1	0	0.1	0	2.4	0	2.4	0
unidentified buteo	0	0.05	0.02	0	0	0.7	0.1	0	0	4.8	2.4	0
Swainson's hawk	0.02	0.05	0.07	0	<0.1	0.7	0.3	0	2.4	4.8	2.4	0
Northern Harrier	0.02	0.02	0.26	0	<0.1	0.4	1.2	0	2.4	2.4	21.4	0
northern harrier	0.02	0.02	0.26	0	<0.1	0.4	1.2	0	2.4	2.4	21.4	0
Eagles	0.02	0	0.02	0.03	<0.1	0	0.1	1.0	1.7	0	2.4	2.6
golden eagle	0.02	0	0.02	0	<0.1	0	0.1	0	1.7	0	2.4	0
bald eagle	0	0	0	0.03	0	0	0	1.0	0	0	0	2.6
Falcons	0	0	0.12	0	0	0	0.6	0	0	0	7.1	0
merlin	0	0	0.02	0	0	0	0.1	0	0	0	2.4	0
American kestrel	0	0	0.07	0	0	0	0.3	0	0	0	4.8	0
unidentified falcon	0	0	0.02	0	0	0	0.1	0	0	0	2.4	0
Other Raptors	0	0	0.05	0	0	0	0.2	0	0	0	4.8	0
unidentified raptor	0	0	0.05	0	0	0	0.2	0	0	0	4.8	0
Vultures	**0.21**	**0.05**	**0.12**	**0**	**0.2**	**0.7**	**0.6**	**0**	**7.1**	**4.8**	**7.1**	**0**
turkey vulture	0.21	0.05	0.12	0	0.2	0.7	0.6	0	7.1	4.8	7.1	0
Upland Game Birds	**0.64**	**0.62**	**0.17**	**0.99**	**0.5**	**9.6**	**0.8**	**37.4**	**36.0**	**40.5**	**11.9**	**15.8**
wild turkey	0	0.02	0	0	0	0.4	0	0	0	2.4	0	0
ring-necked pheasant	0.64	0.60	0.17	0.99	0.5	9.3	0.8	37.4	36.0	38.1	11.9	15.8
Doves/Pigeons	**0.63**	**1.57**	**1.98**	**1.48**	**0.5**	**24.4**	**9.3**	**55.6**	**21.7**	**59.5**	**33.3**	**22.0**
rock pigeon	0.34	0.21	1.71	1.46	0.3	3.3	8.1	54.9	9.8	11.9	19.0	20.3
Eurasian collared-dove	0	0.02	0	0.02	0	0.4	0	0.7	0	2.4	0	1.8
mourning dove	0.29	1.33	0.26	0	0.2	20.7	1.2	0	11.9	57.1	14.3	0
Large Corvids	**1.21**	**0.05**	**0.81**	**0.16**	**1.0**	**0.7**	**3.8**	**6.1**	**25.2**	**4.8**	**11.9**	**8.5**
American crow	1.21	0.05	0.81	0.16	1.0	0.7	3.8	6.1	25.2	4.8	11.9	8.5
Overall	**121.15**	**6.43**	**21.21**	**2.66**	**100**	**100**	**100**	**100**				

Sums may not equal total values shown due to rounding.

Appendix B2. Mean small bird use (number of observations/100-meter plot/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point avian use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Passerines	**9.73**	**10.29**	**4.40**	**2.18**	**99.8**	**99.5**	**98.9**	**100**	**69.0**	**92.9**	**59.5**	**16.7**
Passerines(Subtype)	0.05	0.52	0.86	0	0.5	5.1	19.3	0	4.8	31.0	31.0	0
unidentified passerine	0.05	0.52	0.86	0	0.5	5.1	19.3	0	4.8	31.0	31.0	0
Blackbirds/Orioles	5.30	3.14	2.71	0	54.3	30.4	61.0	0	47.1	59.5	31.0	0
red-winged blackbird	3.42	0.71	1.69	0	35.0	6.9	38.0	0	28.1	19.0	7.1	0
bobolink	0.17	0.38	0	0	1.7	3.7	0	0	7.1	11.9	0	0
Brewer's blackbird	0	0.43	0	0	0	4.1	0	0	0	4.8	0	0
brown-headed cowbird	0.69	0.62	0	0	7.1	6.0	0	0	21.4	26.2	0	0
common grackle	0.26	0.33	0.07	0	2.7	3.2	1.6	0	7.1	19.0	7.1	0
western meadowlark	0.36	0.64	0.26	0	3.7	6.2	5.9	0	16.7	19.0	9.5	0
European starling	0.26	0	0.07	0	2.7	0	1.6	0	11.9	0	4.8	0
yellow-headed blackbird	0.10	0	0	0	1.0	0	0	0	2.4	0	0	0
unidentified blackbird	0.05	0.02	0.62	0	0.5	0.2	13.9	0	2.4	2.4	11.9	0
Finches/Crossbills	0.14	0.45	0.19	0	1.5	4.4	4.3	0	7.1	35.7	11.9	0
American goldfinch	0.14	0.45	0.19	0	1.5	4.4	4.3	0	7.1	35.7	11.9	0
Flycatchers	0.05	0.19	0	0	0.5	1.8	0	0	2.4	14.3	0	0
eastern kingbird	0.05	0.19	0	0	0.5	1.8	0	0	2.4	14.3	0	0
Grassland/Sparrows	3.87	2.95	0.50	2.13	39.7	28.6	11.2	97.8	50.7	73.8	19.0	14.3
Henslow's sparrow	0	0.02	0	0	0	0.2	0	0	0	2.4	0	0
grasshopper sparrow	0.02	0.10	0	0	0.2	0.9	0	0	2.4	7.1	0	0
Lapland longspur	2.83	0	0	0	29.1	0	0	0	5.0	0	0	0
unidentified longspur	0.02	0	0	0	0.2	0	0	0	2.4	0	0	0
horned lark	0.54	0.26	0.29	2.13	5.5	2.5	6.4	97.8	23.6	14.3	9.5	14.3
song sparrow	0.07	0.50	0.02	0	0.7	4.8	0.5	0	7.1	28.6	2.4	0
house sparrow	0.05	0.02	0	0	0.5	0.2	0	0	2.4	2.4	0	0
savannah sparrow	0.12	0.17	0	0	1.2	1.6	0	0	7.1	9.5	0	0
vesper sparrow	0.07	0.19	0	0	0.7	1.8	0	0	4.8	14.3	0	0
dickcissel	0.02	1.07	0	0	0.2	10.4	0	0	2.4	31.0	0	0
clay-colored sparrow	0.05	0.31	0	0	0.5	3.0	0	0	2.4	21.4	0	0
chipping sparrow	0.02	0.12	0	0	0.2	1.2	0	0	2.4	7.1	0	0
American tree sparrow	0	0	0.14	0	0	0	3.2	0	0	0	4.8	0
unidentified sparrow	0.05	0.19	0.05	0	0.5	1.8	1.1	0	1.7	14.3	2.4	0
Mimids	0	0.02	0	0	0	0.2	0	0	0	2.4	0	0
brown thrasher	0	0.02	0	0	0	0.2	0	0	0	2.4	0	0

Appendix B2. Mean small bird use (number of observations/100-meter plot/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point avian use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Swallows	0.17	2.21	0.05	0	1.7	21.4	1.1	0	2.4	33.3	2.4	0
barn swallow	0.17	1.14	0.05	0	1.7	11.1	1.1	0	2.4	19.0	2.4	0
cliff swallow	0	0.90	0	0	0	8.8	0	0	0	14.3	0	0
northern rough-winged swallow	0	0.05	0	0	0	0.5	0	0	0	2.4	0	0
unidentified swallow	0	0.12	0	0	0	1.2	0	0	0	9.5	0	0
Thrushes	0.06	0.19	0.02	0	0.6	1.8	0.5	0	4.0	11.9	2.4	0
American robin	0.06	0.19	0.02	0	0.6	1.8	0.5	0	4.0	11.9	2.4	0
Warblers	0.10	0.14	0	0	1.0	1.4	0	0	2.4	9.5	0	0
common yellowthroat	0.10	0.14	0	0	1.0	1.4	0	0	2.4	9.5	0	0
Wrens	0	0.45	0	0	0	4.4	0	0	0	23.8	0	0
sedge wren	0	0.45	0	0	0	4.4	0	0	0	23.8	0	0
Corvids	0	0	0.07	0.05	0	0	1.6	2.2	0	0	4.8	2.4
blue jay	0	0	0.07	0.05	0	0	1.6	2.2	0	0	4.8	2.4
Woodpeckers	**0.02**	**0.05**	**0.05**	**0**	**0.2**	**0.5**	**1.1**	**0**	**2.4**	**4.8**	**4.8**	**0**
northern flicker	0	0	0.02	0	0	0	0.5	0	0	0	2.4	0
red-headed woodpecker	0	0.02	0	0	0	0.2	0	0	0	2.4	0	0
downy woodpecker	0.02	0.02	0	0	0.2	0.2	0	0	2.4	2.4	0	0
hairy woodpecker	0	0	0.02	0	0	0	0.5	0	0	0	2.4	0
Overall	**9.75**	**10.33**	**4.45**	**2.18**	**100**	**100**	**100**	**100**				

Sums may not equal total values shown due to rounding.

Appendix C. Species Exposure Indices for Large Birds during Fixed-Point Avian Use Surveys at theTatanka Ridge Wind Project from April 20, 2018 to March 26, 2019.

Appendix C1. Relative exposure index and flight characteristics for each large bird species during the 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 – March 26, 2019.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH[a] Based on Initial Observation	Exposure Index	% Within RSH at Any Time
snow goose	8	26.64	100	98.0	26.12	98.0
greater white-fronted goose	4	1.22	100	100	1.22	100
Canada goose	32	1.29	99.2	68.3	0.87	78.0
Franklin's gull	9	3.22	100	12.2	0.39	81.4
double-crested cormorant	1	0.30	100	100	0.30	100
American white pelican	5	0.29	100	100	0.29	100
mallard	26	0.30	90.6	52.1	0.14	56.2
red-tailed hawk	35	0.24	95.1	33.3	0.08	64.1
unidentified duck	4	0.25	100	18.4	0.05	49.0
turkey vulture	11	0.10	100	31.2	0.03	81.2
common merganser	1	0.03	100	100	0.03	100
trumpeter swan	1	0.02	100	100	0.02	100
bald eagle	1	<0.01	100	100	<0.01	100
Wilson's snipe	1	0.04	16.7	100	<0.01	100
unidentified buteo	3	0.02	100	33.3	<0.01	33.3
Swainson's hawk	3	0.04	83.3	20.0	<0.01	80.0
unidentified raptor	2	0.01	100	50.0	<0.01	50.0
merlin	1	<0.01	100	100	<0.01	100
great blue heron	3	0.02	100	33.3	<0.01	66.7
golden eagle	2	0.01	100	50.0	<0.01	50.0
American crow	29	0.56	86.6	0	0	0
mourning dove	42	0.47	74.7	0	0	3.4
Eurasian collared-dove	1	0.01	50.0	0	0	0
rock pigeon	34	0.93	100	0	0	13.0
ring-necked pheasant	12	0.60	49.6	0	0	0
unidentified falcon	1	<0.01	100	0	0	0
American kestrel	3	0.02	100	0	0	33.3
northern harrier	12	0.08	100	0	0	7.7
rough-legged hawk	2	0.01	100	0	0	0
sharp-shinned hawk	2	0.01	100	0	0	0
ring-billed gull	1	<0.01	100	0	0	0
unidentified gull	1	0.24	100	0	0	0
killdeer	35	0.62	64.8	0	0	0
unidentified shorebird	1	<0.01	100	0	0	0
gadwall	2	0.04	100	0	0	0
blue-winged teal	1	0.05	33.3	0	0	0
northern shoveler	1	0.09	26.7	0	0	0
wood duck	2	0.02	100	0	0	0
unidentified goose	1	0.18	100	0	0	0

Appendix C1. Relative exposure index and flight characteristics for each large bird species during the 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 – March 26, 2019.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH[a] Based on Initial Observation	Exposure Index	% Within RSH at Any Time
great egret	2	0.01	100	0	0	50.0
wild turkey	0	<0.01	0			
unidentified yellowlegs	0	<0.01	0			
upland sandpiper	0	0.05	0			
northern pintail	0	0.04	0			

[a] RSH = The likely “rotor swept heights” for potential collision with a turbine blade, or 25−150 meters (82−492 feet) above ground level.

Appendix C2. Relative exposure index and flight characteristics for small bird species during the 10-minute fixed-point small bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH[a] Based on Initial Observation	Exposure Index	% Within RSH at Any Time
Lapland longspur	8	0.71	96.5	3.0	0.02	64.0
unidentified swallow	4	0.03	100	40.0	0.01	40.0
downy woodpecker	1	0.01	50.0	0	0	0
northern flicker	1	<0.01	100	0	0	0
blue jay	3	0.03	80.0	0	0	0
northern rough-winged swallow	1	0.01	100	0	0	0
cliff swallow	12	0.23	100	0	0	0
barn swallow	18	0.34	100	0	0	0
clay-colored sparrow	2	0.09	20.0	0	0	0
vesper sparrow	4	0.07	36.4	0	0	0
house sparrow	1	0.02	33.3	0	0	0
song sparrow	1	0.15	12.0	0	0	0
horned lark	23	0.80	75.3	0	0	0
unidentified longspur	1	<0.01	100	0	0	0
unidentified sparrow	6	0.07	84.6	0	0	0
eastern kingbird	3	0.06	50.0	0	0	0
American goldfinch	7	0.20	21.2	0	0	0
yellow-headed blackbird	1	0.02	100	0	0	0
European starling	7	0.08	64.3	0	0	0
western meadowlark	12	0.32	28.3	0	0	0
common grackle	20	0.17	89.3	0	0	0
brown-headed cowbird	17	0.33	74.5	0	0	0
Brewer’s blackbird	2	0.11	100	0	0	0
bobolink	4	0.14	17.4	0	0	0
red-winged blackbird	31	1.46	91.6	0	0	0
unidentified blackbird	6	0.17	62.1	0	0	0
unidentified passerine	15	0.36	48.3	0	0	0
hairy woodpecker	0	<0.01	0			
red-headed woodpecker	0	<0.01	0			
sedge wren	0	0.11	0			
common yellowthroat	0	0.06	0			
American robin	0	0.07	0			
brown thrasher	0	<0.01	0			
American tree sparrow	0	0.04	0			
chipping sparrow	0	0.04	0			
dickcissel	0	0.28	0			
savannah sparrow	0	0.07	0			
grasshopper sparrow	0	0.03	0			
Henslow’s sparrow	0	<0.01	0			

[a]RSH = The likely “rotor swept heights (RSH)” for potential collision with a turbine blade, or 25−150 meters (82−492 feet) above ground level.

Appendix D. Spatial Use by Point during Fixed-Point Avian Use Surveys at the Tatanka Ridge Wind Project from April 20, 2018 to March 26, 2019.

Appendix D1. Mean use (number of observations/800-meter plot/60-minute survey) by point for all large birds, major bird types, and diurnal raptor subtypes observed at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019. Points 19-25 were added in February 2019

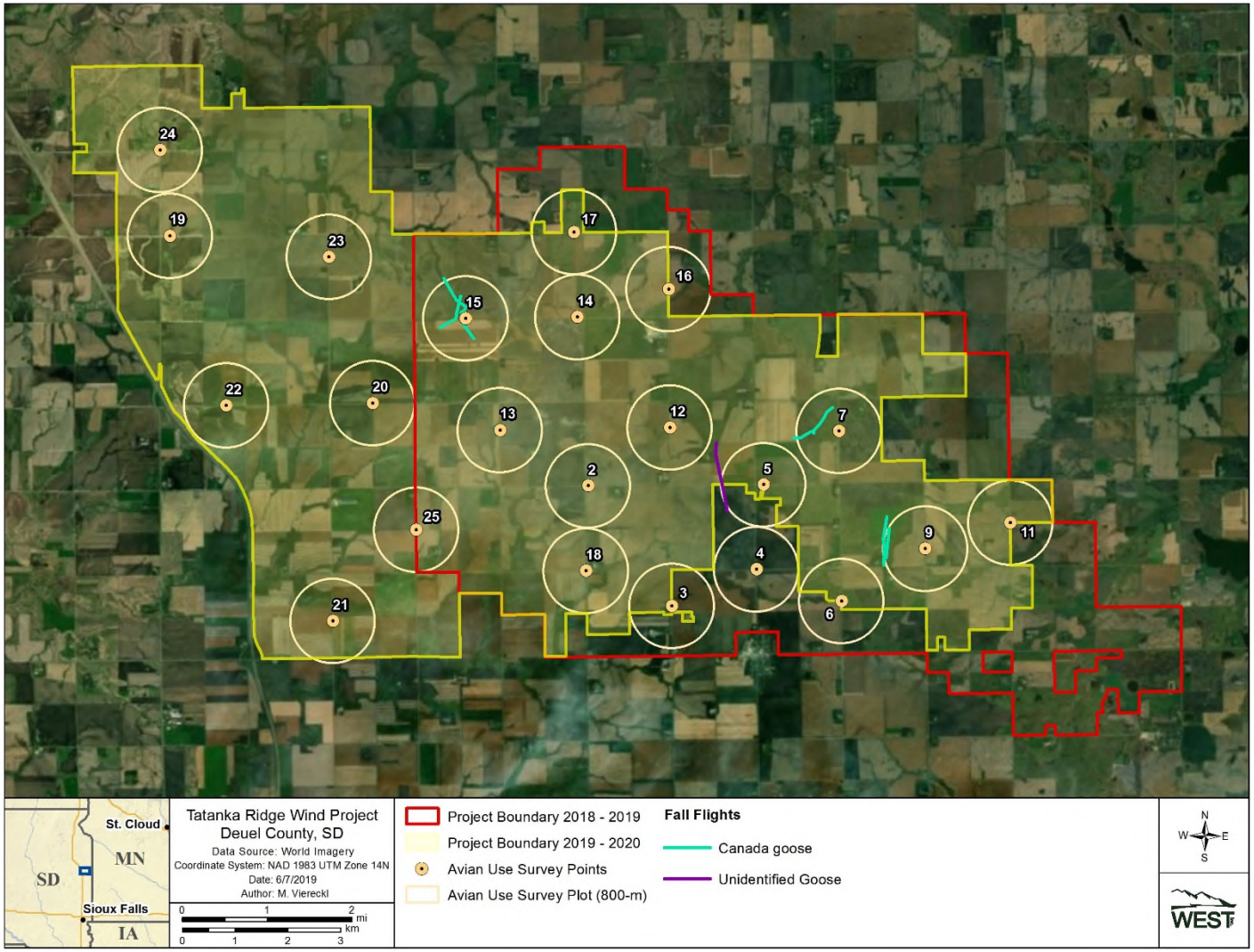
	Sur vey Point										
Bird Type	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**11**	**12**	**13**	**14**
Waterbirds	**0**	**0**	**0.27**	**0**	**3.33**	**0.08**	**0**	**0**	**0.33**	**0**	**0**
Waterfowl	**0.25**	**0.08**	**27.91**	**491.33**	**2.08**	**2.25**	**9.25**	**37.25**	**0.92**	**2.75**	**3.58**
Shorebirds	**0**	**0.25**	**1.27**	**1.42**	**1.75**	**0.50**	**0**	**0.17**	**1.25**	**1.42**	**0.42**
Gulls/Terns	**5.50**	**0**	**4.55**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**34.67**
Diurnal Raptors	**0.33**	**0.08**	**0.45**	**0.25**	**0.67**	**0.67**	**0.67**	**0.58**	**0.75**	**0.33**	**0.42**
Accipiters	0	0	0	0	0	0	0.08	0	0	0	0
Buteos	0.08	0	0.27	0.17	0.58	0.58	0.50	0.50	0.58	0.25	0.08
Northern Harrier	0.17	0	0.18	0.08	0.08	0	0.08	0	0	0.08	0.17
Eagles	0	0.08	0	0	0	0	0	0	0	0	0
Falcons	0	0	0	0	0	0.08	0	0	0.17	0	0.17
Other Raptors	0.08	0	0	0	0	0	0	0.08	0	0	0
Vultures	**0.08**	**0**	**0**	**0**	**0**	**0.25**	**0**	**0.25**	**0.25**	**0**	**0.08**
Upland Game Birds	**0**	**0.25**	**0.36**	**0.83**	**0**	**0.67**	**0.25**	**0.67**	**0.33**	**1.00**	**0**
Doves/Pigeons	**2.42**	**2.08**	**0.27**	**0.67**	**1.00**	**0.33**	**0.83**	**0**	**4.33**	**0.58**	**3.25**
Large Corvids	**1.50**	**0.17**	**0**	**0**	**0.33**	**0**	**0.08**	**0**	**0.42**	**0.25**	**1.17**
All Large Birds	**10.08**	**2.92**	**35.09**	**494.50**	**9.17**	**4.83**	**11.08**	**38.92**	**8.58**	**6.33**	**43.58**

Sums may not equal total values shown due to rounding.

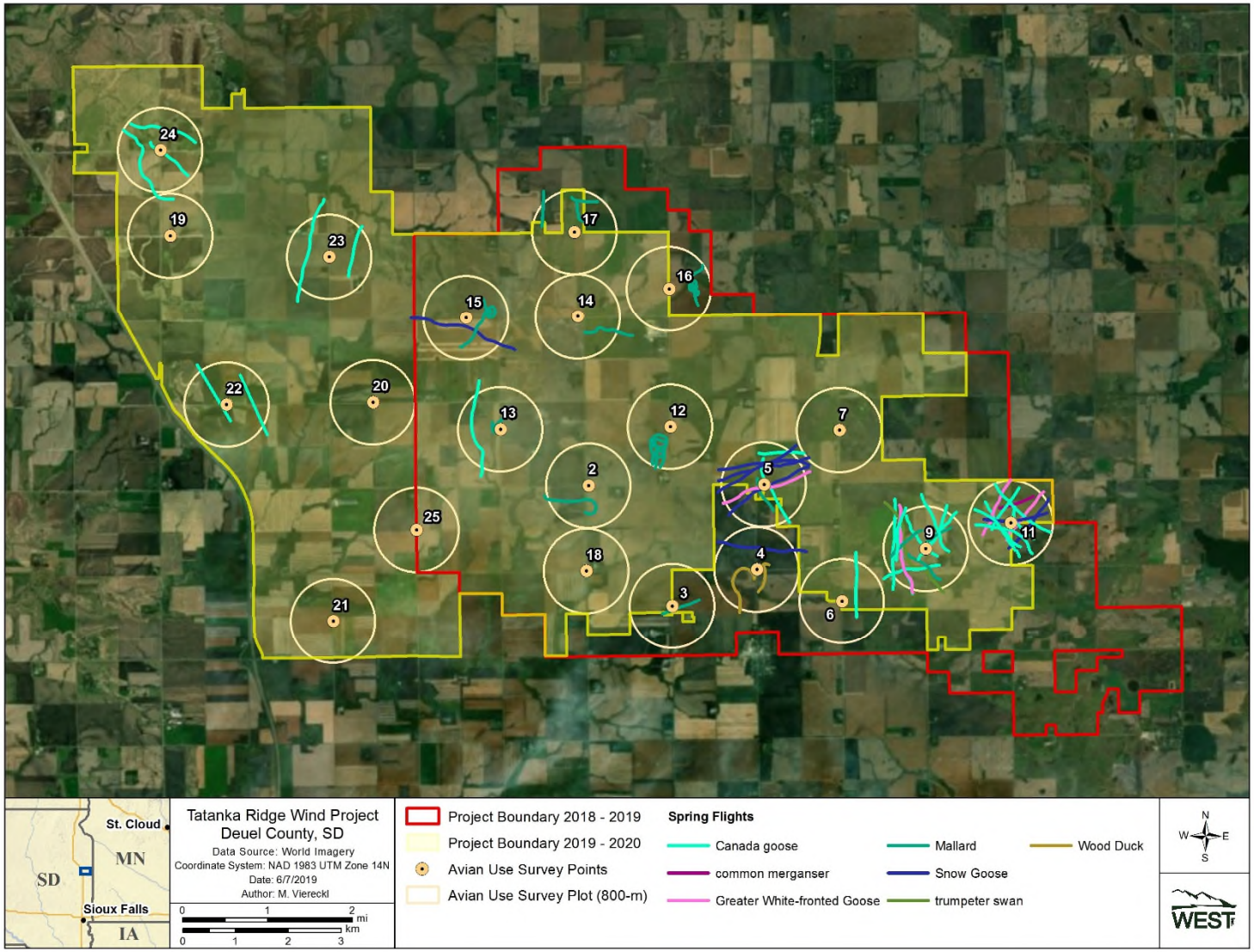
Appendix D1 (*continued*). Mean use (number of observations/800-meter plot/60-minute survey) by point for all large birds, major bird types, and diurnal raptor subtypes observed at the Tatanka Ridge Wind Project from April 20, 2018 − March 26, 2019. Points 19-25 were added in February 2019

	Survey Point										
Bird Type	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Waterbirds	**6.25**	**0**	**0.42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Waterfowl	**10.00**	**1.30**	**0.42**	**0**	**0**	**0**	**0**	**4.50**	**5.00**	**12.50**	**0**
Shorebirds	**0.50**	**0.70**	**0.83**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.50**
Gulls/Terns	**0**	**5.00**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Diurnal Raptors	**0.50**	**0.50**	**0.33**	**0**	**0**	**0.50**	**0**	**0**	**0**	**0**	**0.50**
Accipiters	0	0.10	0	0	0	0	0	0	0	0	0
Buteos	0.12	0.30	0.33	0	0	0.50	0	0	0	0	0
Northern Harrier	0.38	0	0	0	0	0	0	0	0	0	0
Eagles	0	0.10	0	0	0	0	0	0	0	0	0.50
Falcons	0	0	0	0	0	0	0	0	0	0	0
Other Raptors	0	0	0	0	0	0	0	0	0	0	0
Vultures	**0**	**0.50**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Upland Game Birds	**0.75**	**0.40**	**0.58**	**0**	**0**	**20.00**	**0**	**0**	**0**	**0**	**2.50**
Doves/Pigeons	**0.12**	**2.60**	**1.92**	**2.67**	**0**	**0**	**0**	**0**	**0**	**1.50**	**0**
Large Corvids	**1.38**	**0.20**	**1.17**	**0**	**0**	**10.00**	**1.00**	**0**	**1.00**	**7.00**	**0**
All Large Birds	**19.50**	**11.20**	**5.67**	**2.67**	**0**	**30.50**	**1.00**	**4.50**	**6.00**	**21.00**	**3.50**

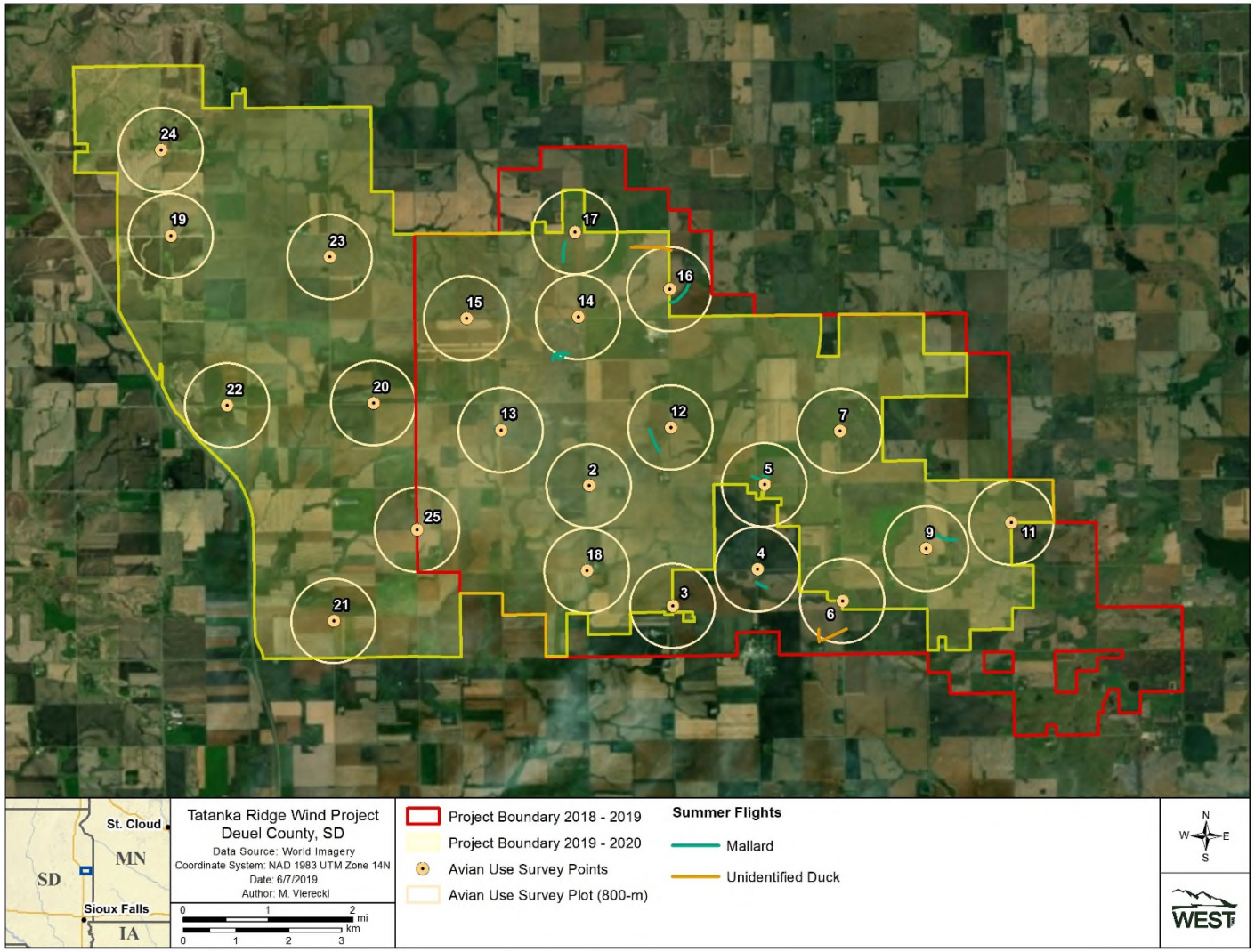
Sums may not equal total values shown due to rounding.



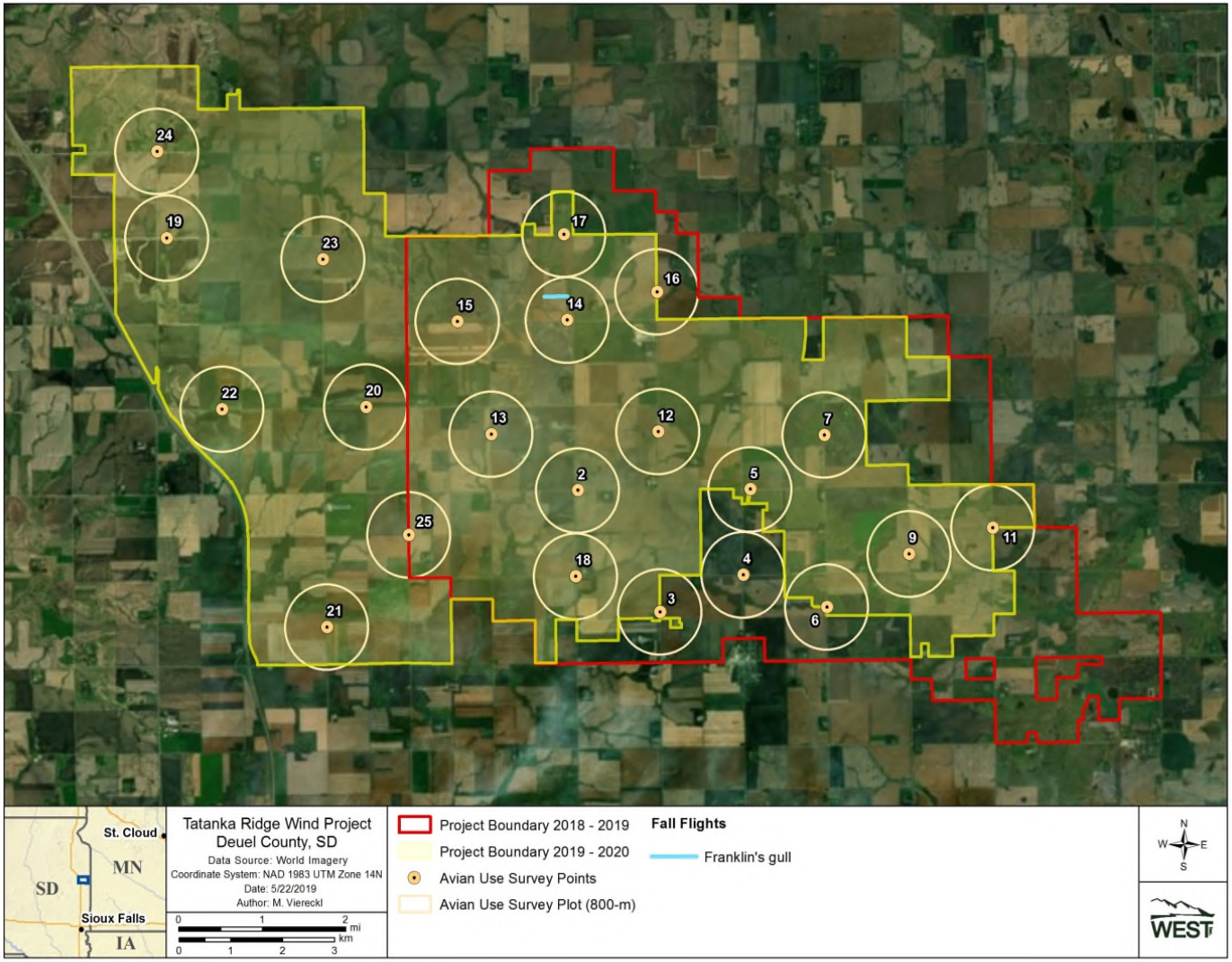
Appendix D2. Waterfowl flight paths recorded during the fall season during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



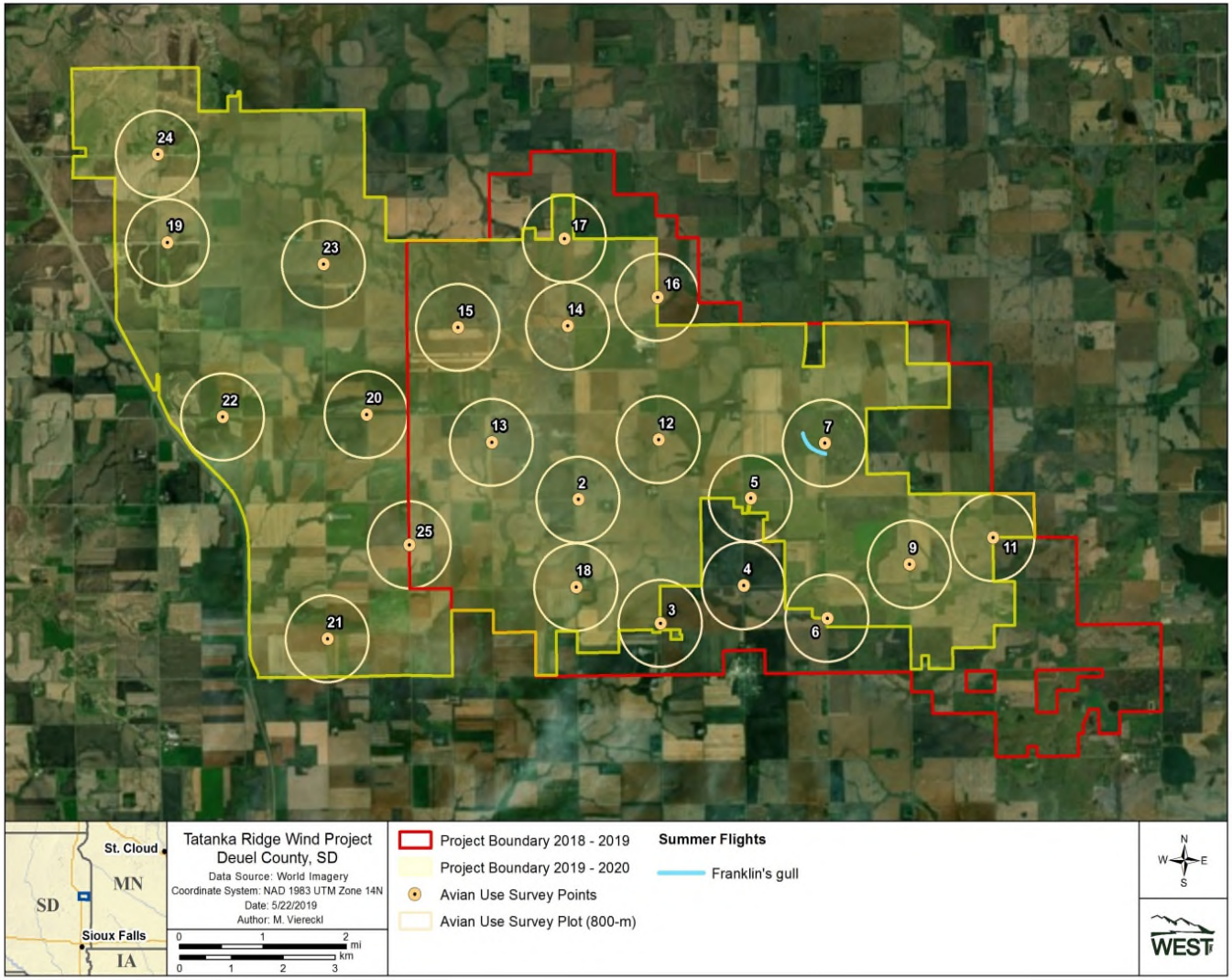
Appendix D2 (*continued*). Waterfowl flight paths recorded during the spring season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



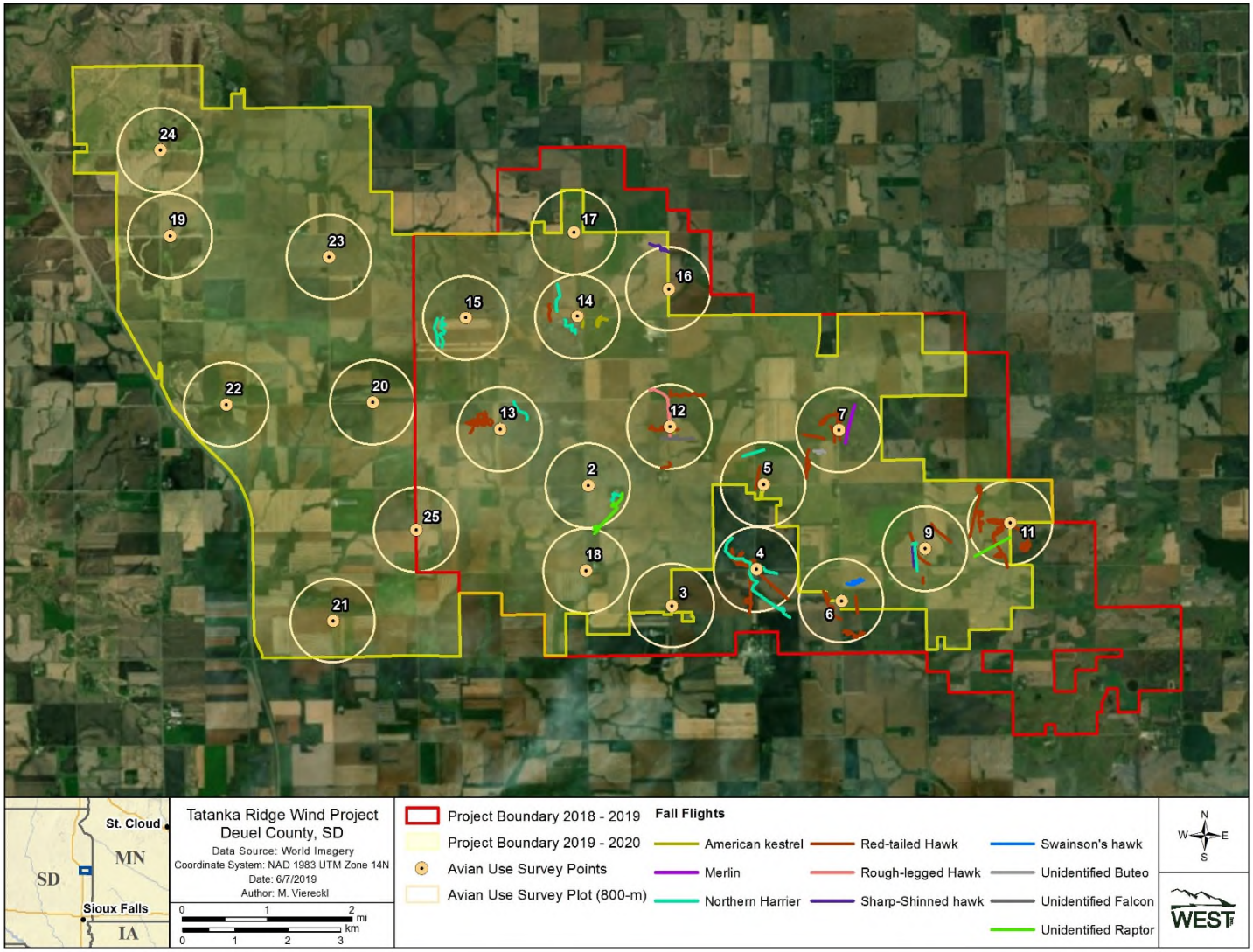
Appendix D2 (*continued*). Waterfowl flight paths recorded during the summer season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019



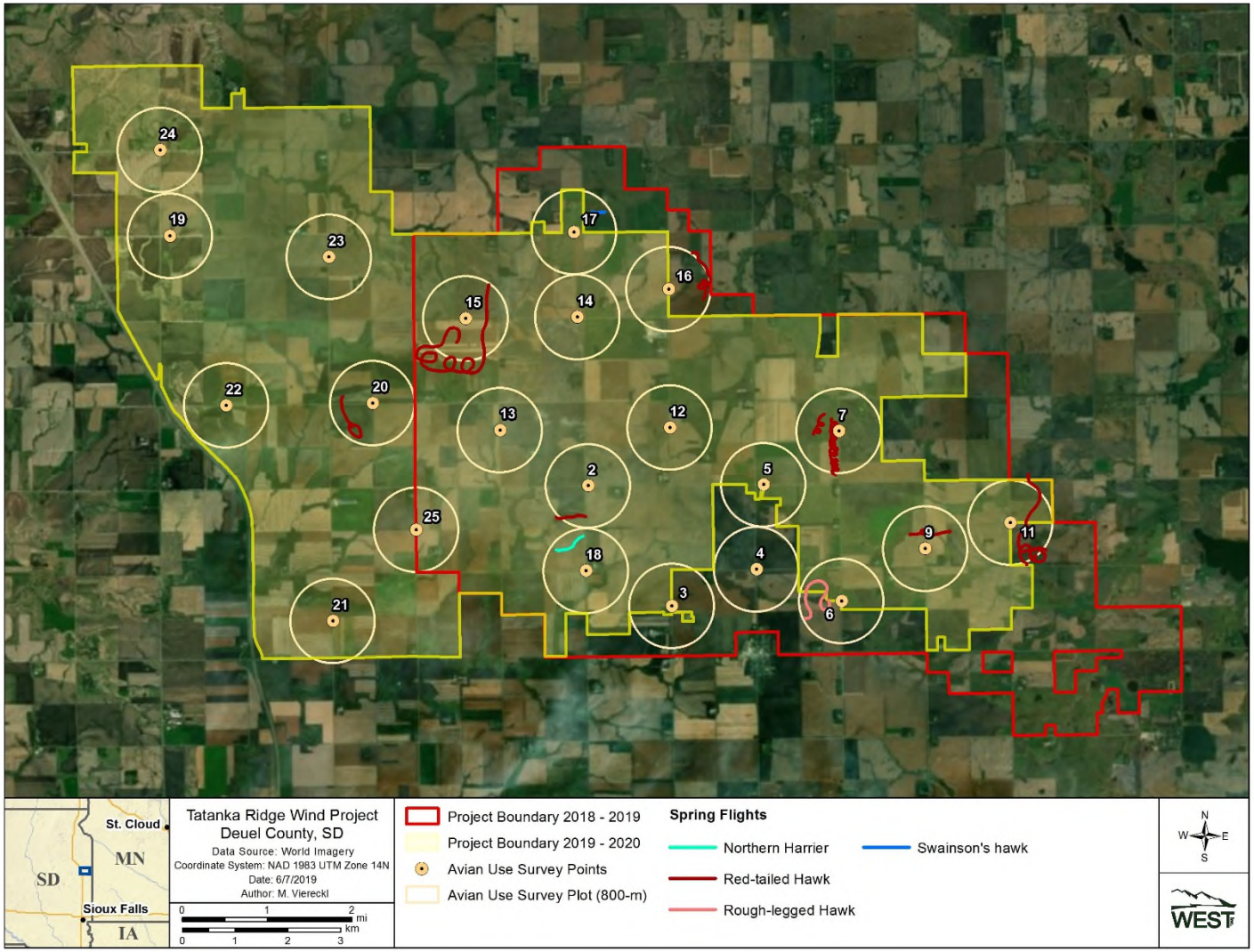
Appendix D2 (*continued*). Gull and tern flight paths recorded during the fall season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



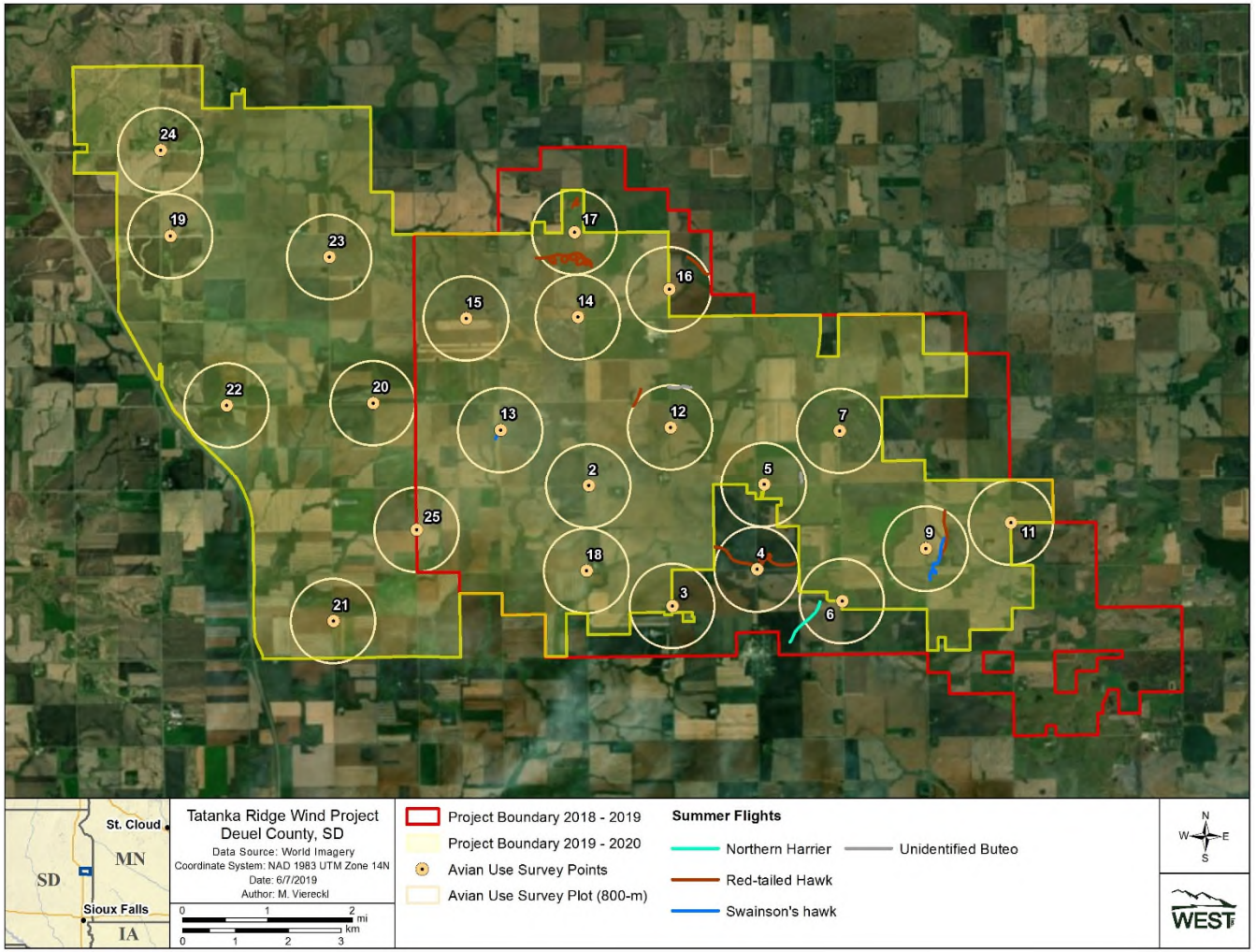
Appendix D2 (*continued*). Gulls and terns flight paths recorded during the summer season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



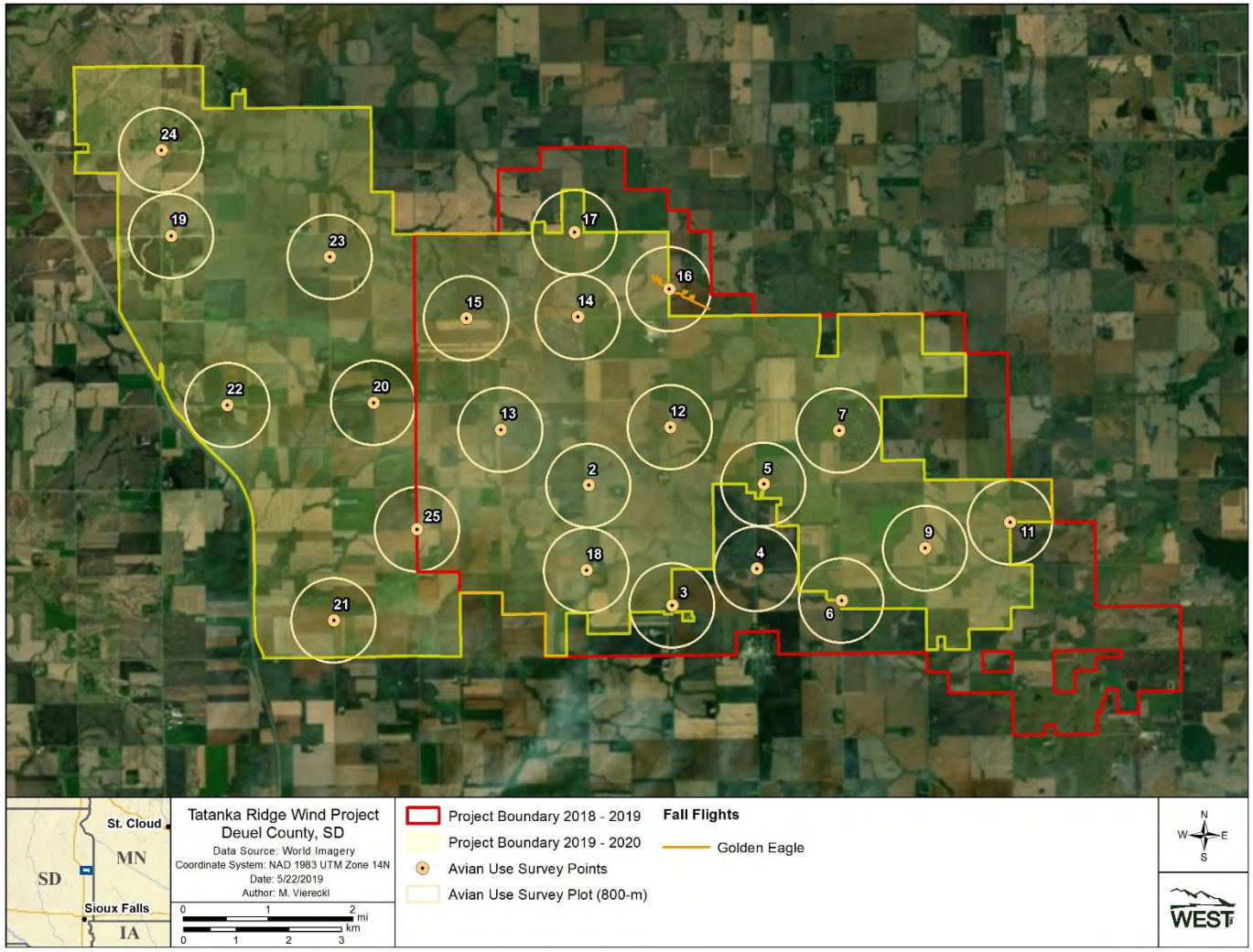
Appendix D2 (*continued*). Diurnal raptor flight paths recorded during the fall season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



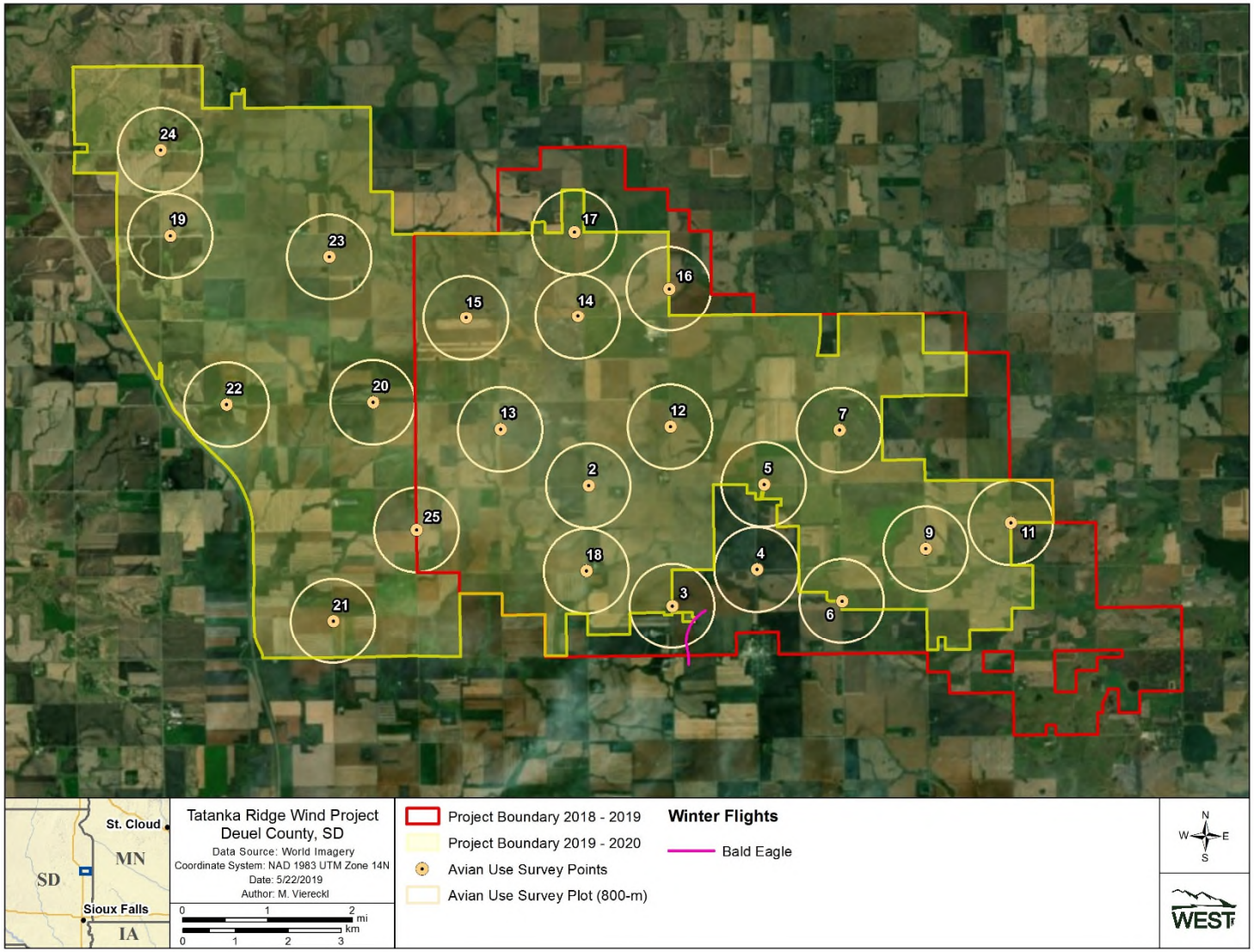
Appendix D2 (*continued*). Diurnal raptor flight paths recorded during the spring season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



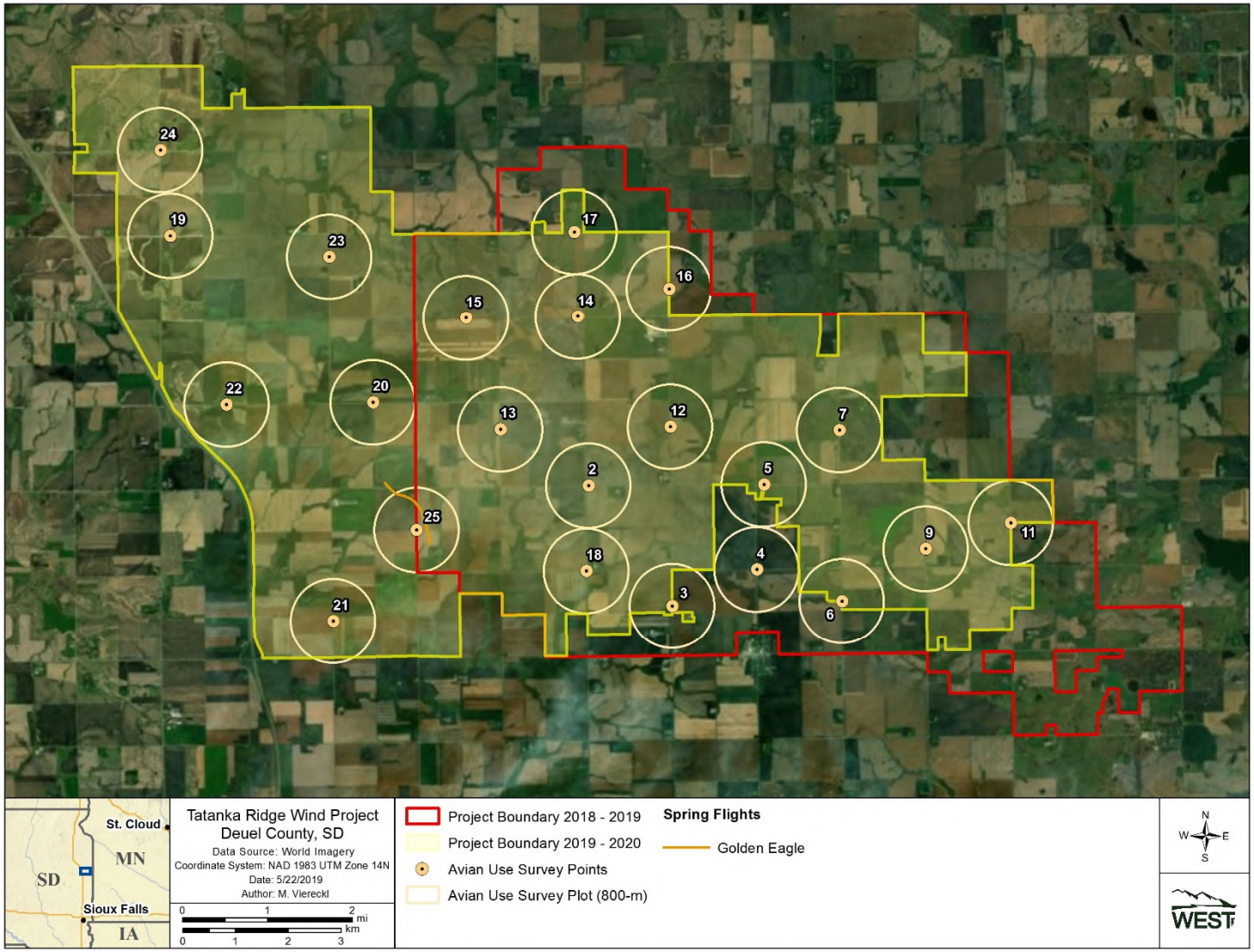
Appendix D2 (*continued*). Diurnal raptor flight paths recorded during the summer season during 60-minute fixed-point bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



Appendix D2 (*continued*). Eagle flight paths recorded during the fall season during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



Appendix D2 (*continued*). Eagle flight paths recorded during the winter season during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.



Appendix D2 (*continued*). Eagle flight paths recorded during the spring season during 60-minute fixed-point large bird use surveys at the Tatanka Ridge Wind Project, Deuel County, South Dakota from April 20, 2018 − March 26, 2019. Points 19–25 were added in February 2019.

Appendix D3. Mean use (number of observations/100-meter plot/10-minute survey) by point for all small birds observed at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 to March 26, 2019.

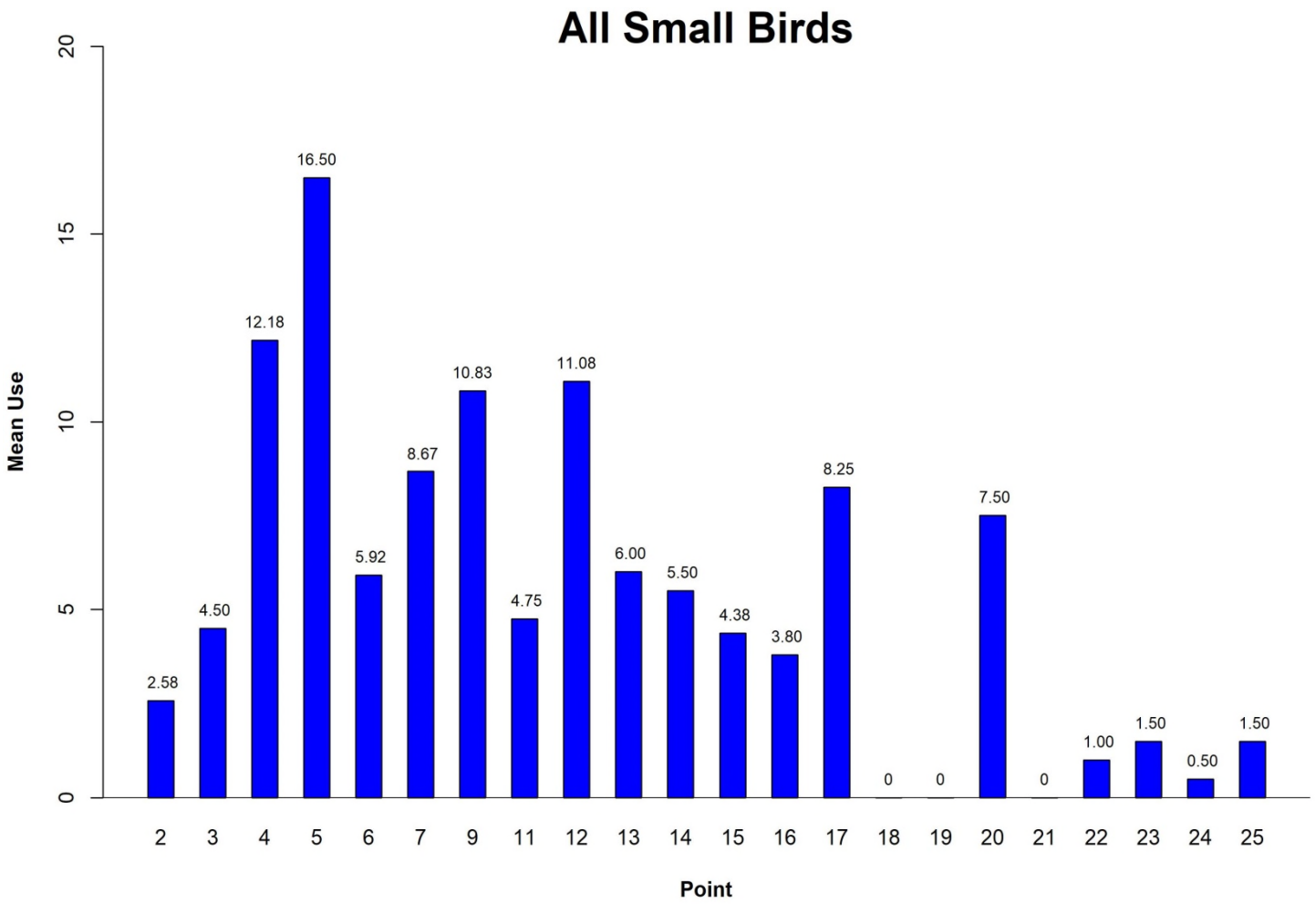
Bird Type	Survey Point										
	2	**3**	**4**	**5**	**6**	**7**	**9**	**11**	**12**	**13**	**14**
Passerines	2.50	4.33	12.18	16.50	5.92	8.67	10.83	4.67	11.08	6.00	5.50
Woodpeckers	0.08	0.17	0	0	0	0	0	0.08	0	0	0
All Small Birds	**2.58**	**4.50**	**12.18**	**16.50**	**5.92**	**8.67**	**10.83**	**4.75**	**11.08**	**6.00**	**5.50**

Sums may not equal total values shown due to rounding.

Appendix D3 (*continued*). Mean use (number of observations/100-meter plot/10-minute survey) by point for all small birds observed at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019.

	Survey Point										
Bird Type	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Passerines	4.25	3.80	8.25	0	0	7.50	0	1.00	1.50	0.50	1.50
Woodpeckers	0.12	0	0	0	0	0	0	0	0	0	0
All Small Birds	**4.38**	**3.80**	**8.25**	**0**	**0**	**7.50**	**0**	**1.00**	**1.50**	**0.50**	**1.50**

Sums may not equal total values shown due to rounding.



Appendix D4. Relative small bird use by observation point during 10-minute fixed-point small bird use surveys at the Tatanka Ridge Wind Project in Deuel County, South Dakota from April 20, 2018 − March 26, 2019

Appendix E: Midwestern Cumulative Fatalities Summary Table

Appendix E1. Wind energy facilities in the Midwest region of North America with publicly available cumulative fatality data on for all bird species.

Bird Type	Reported Fatalities	Percent Composition
Passerines	993	54.8
Unidentified Birds	133	7.3
Waterfowl	125	6.9
Upland Game Birds	111	6.1
Diurnal Raptors	107	5.9
Shorebirds	93	5.1
Doves/Pigeons	89	4.9
Rails/Coots	39	2.1
Vultures	29	1.6
Swifts/Hummingbirds	19	1.0
Cuckoos	18	0.9
Gulls/Terns	18	0.9
Loons/Grebes	16	0.9
Woodpeckers	10	0.6
Waterbirds	4	0.2
Owls	4	0.2
Large Corvids	2	0.1
Goatsuckers	1	<0.1
Total[a]	**1,811**	**100**

[a] Sums of values may not add to total value shown due to rounding.

Appendix E1 (*continued*). Wind energy facilities in the Midwest region of North America with publicly available cumulative fatality data on for all bird species.

Wind Energy Facility	Source	Wind Energy Facility	Source
Barton I & II, IA (2010-2011)	Derby et al. 2011b	Grand Ridge I, IL (2009-2010)	Derby et al. 2010a
Big Blue, MN (2013)	Fagen Engineering 2014	Harrow, ON (2010)	Natural Resource Solutions 2011
Big Blue, MN (2014)	Fagen Engineering 2015	Heritage Garden, MI (2012-2013)	Kerlinger et al. 2014
Bishop Hill (2012)	Good et al. 2014	Kewaunee County, WI (1999-2001)	Howe et al. 2002
Blue Sky Green Field, WI (2008; 2009)	Gruver et al. 2009	Lakefield Wind, MN (2012)	Minnesota Public Utilities Commission (MPUC) 2012
Buffalo Ridge, MN (1994-1995)	Osborn et al. 1996, 2000	Melancthon, ON (Phase I; 2007)	Stantec Ltd. 2008
Buffalo Ridge, MN (2000)	Krenz and McMillan 2000	Moraine II, MN (2009)	Derby et al. 2010h
Buffalo Ridge, MN (Phase I; 1996)	Johnson et al. 2000a	NPPD Ainsworth, NE (2006)	Derby et al. 2007
Buffalo Ridge, MN (Phase I; 1997)	Johnson et al. 2000a	Odell, MN (2016-2017)	Chodachek and Gustafson 2018
Buffalo Ridge, MN (Phase I; 1998)	Johnson et al. 2000a	Pioneer Prairie I, IA (Phase II; 2011-2012)	Chodachek et al. 2012
Buffalo Ridge, MN (Phase I; 1999)	Johnson et al. 2000a	Pioneer Prairie II, IA (2013)	Chodachek et al. 2014b
Buffalo Ridge, MN (Phase II; 1998)	Johnson et al. 2000a	Pioneer Trail, IL (2012-2013)	ARCADIS U.S. 2013
Buffalo Ridge, MN (Phase II; 1999)	Johnson et al. 2000a	Pleasant Valley, MN (2016-2017)	Tetra Tech 2017b
Buffalo Ridge, MN (Phase II; 2001/Lake Benton I)	Johnson et al. 2004	Prairie Rose, MN (2014)	Chodachek et al. 2015

Appendix E1 (*continued*). Wind energy facilities in the Midwest region of North America with publicly available cumulative fatality data on for all bird species.

Wind Energy Facility	Source	Wind Energy Facility	Source
Buffalo Ridge, MN (Phase II; 2002/Lake Benton I)	Johnson et al. 2004	PrairieWinds ND1 (Minot), ND (2010)	Derby et al. 2011d
Buffalo Ridge, MN (Phase III; 1999)	Johnson et al. 2000a	PrairieWinds ND1 (Minot), ND (2011)	Derby et al. 2012d
Buffalo Ridge, MN (Phase III; 2001/Lake Benton II)	Johnson et al. 2004	PrairieWinds SD1, SD (2011-2012)	Derby et al. 2012c
Buffalo Ridge, MN (Phase III; 2002/Lake Benton II)	Johnson et al. 2004	PrairieWinds SD1, SD (2012-2013)	Derby et al. 2013
Buffalo Ridge I, SD (2009-2010)	Derby et al. 2010e	PrairieWinds SD1, SD (2013-2014)	Derby et al. 2014b
Buffalo Ridge II, SD (2011-2012)	Derby et al. 2012a	Prince Wind Farm, ON (2006)	NRSI 2009
Cedar Ridge, WI (2009)	BHE Environmental 2010	Prince Wind Farm, ON (2007)	NRSI 2009
Cedar Ridge, WI (2010)	BHE Environmental 2011a	Prince Wind Farm, ON (2008)	NRSI 2009
Crescent Ridge, IL (2005-2006)	Kerlinger et al. 2007	Rail Splitter, IL (2012-2013)	Good et al. 2013b
Crystal Lake II, IA (2009)	Kerlinger et al. 2007	Ripley, ON (2008)	Jacques Whitford 2009
Elm Creek, MN (2009-2010)	Derby et al. 2010g	Ripley, ON (2008-2009)	Golder Associates 2010
Elm Creek II, MN (2011-2012)	Derby et al. 2012b	Rugby, ND (2010-2011)	Derby et al. 2011c
Forward Energy Center, WI (2008-2010)	Grodsky and Drake 2011	Thunder Spirit, ND (2016-2017)	Derby et al. 2018
Fowler I, IN (2009)	Johnson et al. 2010a	Top Crop I & II, IL (2012-2013)	Good et al. 2013c
Fowler III, IN (2009)	Johnson et al. 2010b	Top of Iowa, IA (2003)	Jain 2005
Fowler I, II, III, IN (2010)	Good et al. 2011	Top of Iowa, IA (2004)	Jain 2005
Fowler I, II, III, IN (2011)	Good et al. 2012	Waverly Wind, KS (2016-2017)	Tetra Tech 2017a
Fowler I, II, III, IN (2012)	Good et al. 2013a	Wessington Springs, SD (2009)	Derby et al. 2010d
Fowler, IN (2015)	Good et al. 2016	Wessington Springs, SD (2010)	Derby et al. 2011a
Fowler, IN (2016)	Good et al. 2017	Winnebago, IA (2009-2010)	Derby et al. 2010i
Fowler, IN (2017)	Good et al. 2018		

Appendix E2. Publicly available and comparable all bird and diurnal raptor fatality rate estimates and habitat types from wind energy facilities in the Midwest region of North America.

Project	Bird Fatalities (birds/MW/year)	Raptor Fatalities (raptors/MW/year)	Predominant Habitat Type	Citation
Wessington Springs, SD (2009)	8.25	0.06	grassland	Derby et al. 2010d
Blue Sky Green Field, WI (2008; 2009)	7.17	0	agriculture	Gruver et al. 2009
Cedar Ridge, WI (2009)	6.55	0.18	agriculture	BHE Environ-mental 2010
Buffalo Ridge, MN (Phase III; 1999)	5.93	0	agriculture	Johnson et al. 2000a
Moraine II, MN (2009)	5.59	0.37	agriculture/grassland	Derby et al. 2010h
Barton I & II, IA (2010-2011)	5.5	0	agriculture	Derby et al. 2011b
Buffalo Ridge I, SD (2009-2010)	5.06	0.2	agriculture/grassland	Derby et al. 2010e
Odell, MN (2016-2017)	4.69	NA	agriculture	Chodachek and Gustafson 2018
Buffalo Ridge, MN (Phase I; 1996)	4.14	0	agriculture	Johnson et al. 2000a
Winnebago, IA (2009-2010)	3.88	0.27	agriculture/grassland	Derby et al. 2010i
Cedar Ridge, WI (2010)	3.72	0.13	agriculture	BHE Environ-mental 2011b
Elm Creek II, MN (2011-2012)	3.64	0	agriculture, grassland	Derby et al. 2012b
Buffalo Ridge, MN (Phase II; 1999)	3.57	0	agriculture	Johnson et al. 2000a
Buffalo Ridge, MN (Phase I; 1998)	3.14	0	agriculture	Johnson et al. 2000a
Lakefield Wind, MN (2012)	2.75	0	agriculture	Minnesota Public Utilities Commission 2012
Buffalo Ridge, MN (Phase I; 1997)	2.51	0	agriculture	Johnson et al. 2000a
Buffalo Ridge, MN (Phase II; 1998)	2.47	0	agriculture	Johnson et al. 2000a
Heritage Garden, MI (2013-2014)	2.4	NA	agriculture	Kerlinger et al. 2014
PrairieWinds SD1, SD (2012-2013)	2.01	0.03	grassland	Derby et al. 2013
Buffalo Ridge II, SD (2011-2012)	1.99	0	agriculture, grassland	Derby et al. 2012a
Kewaunee County, WI (1999-2001)	1.95	0	agriculture	Howe et al. 2002
PrairieWinds SD1, SD (2013-2014)	1.66	0.17	grassland	Derby et al. 2014b
Elm Creek, MN (2009-2010)	1.55	0	agriculture	Derby et al. 2010f
Buffalo Ridge, MN (Phase I; 1999)	1.43	0.47	agriculture	Johnson et al. 2000a
PrairieWinds SD1, SD (2011-2012)	1.41	0	grassland	Derby et al. 2012c
Top Crop I & II (2012-2013)	1.35	NA	agriculture	Good et al. 2013c
Heritage Garden, MI (2012-2013)	1.3	NA	agriculture	Kerlinger et al. 2014
Wessington Springs, SD (2010)	0.89	0.07	grassland	Derby et al. 2011a
Rail Splitter, IL (2012-2013)	0.84	0	agriculture	Good et al. 2013b
Top of Iowa, IA (2004)	0.81	0.17	agriculture	Jain 2005
Pleasant Valley, MN (2016-2017)	0.68	NA	agriculture; grassland; wetlands	Tetra Tech 2017b
Big Blue, MN (2013)	0.6	0	agriculture	Fagen Engineering 2014
Grand Ridge I, IL (2009-2010)	0.48	0	agriculture	Derby et al. 2010a

Appendix E2. Publicly available and comparable all bird and diurnal raptor fatality rate estimates and habitat types from wind energy facilities in the Midwest region of North America.

Project	Bird Fatalities (birds/MW/year)	Raptor Fatalities (raptors/MW/year)	Predominant Habitat Type	Citation
Prairie Rose, MN (2014)	0.44	0.08	agriculture; grassland	Chodachek et al. 2015
Top of Iowa, IA (2003)	0.42	0	agriculture	Jain 2005
Big Blue, MN (2014)	0.37	0	agriculture	Fagen Engineering 2015
Pioneer Prairie I, IA (Phase II; 2011-2012)	0.27	0	agriculture, grassland	Chodachek et al. 2012

Appendix G

Eagle and Raptor Nest Survey Reports

2018 Eagle and Raptor Nest Survey Report

Tatanka Wind Project

Deuel County, South Dakota

Prepared for:

Buffalo Ridge III, LLC

1125 Northwest Couch Street
Portland, Oregon 97209

Prepared by:

Adam Kreger and Janelle Rieland

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

August 10, 2018

WEST Inc.

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Joyce Pickle	Senior Manager
Janelle Rieland	Project Manager
Adam Kreger	Field Coordinator & GIS Specialist
Jordan Harrison	Biologist
Cecily Foo	Biologist
Carmen Boyd	Project Tracking and Data Manager
Katie Wynne	Technical Editing Coordinator
Linda Koepsell	Technical Editor

REPORT REFERENCE

Kreger, A. and J. Rieland. 2018. 2018 Eagle and Raptor Nest Survey Report, Tatanka Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III Wind, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. August 10, 2018.

TABLE OF CONTENTS

INTRODUCTION 1

SURVEY AREA 1

METHODS 1

Aerial Raptor Nest Survey 1
Terminology 3

RESULTS 4

Bald Eagles 4
Other Raptors 8

LITERATURE CITED 10

LIST OF TABLES

Table 1. Raptor nest identification, location, species, status, substrate, and condition during the April 2018 survey for the Tatanka Wind Project, Deuel County, South Dakota. 6

LIST OF FIGURES

Figure 1. Raptor nest survey area near the Tatanka Wind Project, Deuel County, South Dakota. 2

Figure 2. Locations of raptor and eagle nests observed within 10 miles of the Tatanka Wind Project, Deuel County, South Dakota. 5

Figure 3. Locations of raptor nests observed within one mile of the Tatanka Wind Project, Deuel County, South Dakota. 9

LIST OF APPENDICES

Appendix A. Photographs of Bald Eagle Nests Documented in April and May 2018 within 10 Miles of the Tatanka Wind Project

NOTES ON UNITS

Imperial units are used throughout this document. Conversions to metric units are provided below.

Unit Conversions

Imperial	Metric
1 foot	0.3048 meter
3.28 feet	1 meter
1 mile	1.61 kilometer
0.621 mile	1 kilometer
1 acre	0.40 hectare
2.47 acre	1 hectare

Common Conversions

Imperial	Metric
0.12 miles	200 meters
0.5 miles	800 meters
10 miles	16.1 kilometers

INTRODUCTION

Buffalo Ridge III, LLC (Buffalo Ridge III), a subsidiary of Avangrid Renewables, LLC, has proposed development of the Tatanka Wind Project (Project) on privately owned lands in Deuel County, South Dakota (Figure 1). At Buffalo Ridge III's request, Western EcoSystems Technology, Inc. (WEST) conducted aerial raptor nest surveys 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 US Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). This report provides results of the eagle and raptor nest surveys conducted in April and May 2018.

SURVEY AREA

The Project boundary encompasses an area of approximately 22,905 acres (36 square miles) located approximately five miles west of the South Dakota/Minnesota border, and directly north of the town of Toronto, South Dakota. The survey area for all raptor stick-nests consisted of a 1-mile buffer of the Project boundary, and the survey area for bald eagle nests consisted of a 10-mile buffer of the Project boundary (Figure 1).

The majority of the survey area consists of cultivated agricultural fields with some pastureland, with limited potential substrates for raptor and bald eagle nests. Wooded habitat within the Project boundary is mainly in the form of small woodlots associated with rural homesteads and shelterbelts. More suitable nesting substrate is located outside of the Project boundary in wooded areas associated with larger lakes within the 10-mile buffer around the Project boundary.

METHODS

Aerial Raptor Nest Survey

The first round of aerial survey was conducted from a helicopter in early April (April 10–12, 2018), a period before leaf out when raptors and eagles would be actively tending to a nest or incubating eggs. Aerial surveys were conducted in accordance with the guidance provided in the ECPG (USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). An experienced raptor ecologist and a skilled helicopter pilot conducted the surveys. Raptors are defined for these surveys as kites, accipiters, buteos, harriers, eagles, falcons, and owls (Buehler 2000). The main focus of the surveys was to identify bald eagle and raptor nests and to determine nest activity. Surveyors focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (e.g., trees, transmission lines) within and around the Project. Pre-flight planning included the creation of field maps and mobile Geographic Information System files, and review of relevant background information, such as previously recorded nest locations, topographic maps, and aerial photographs.

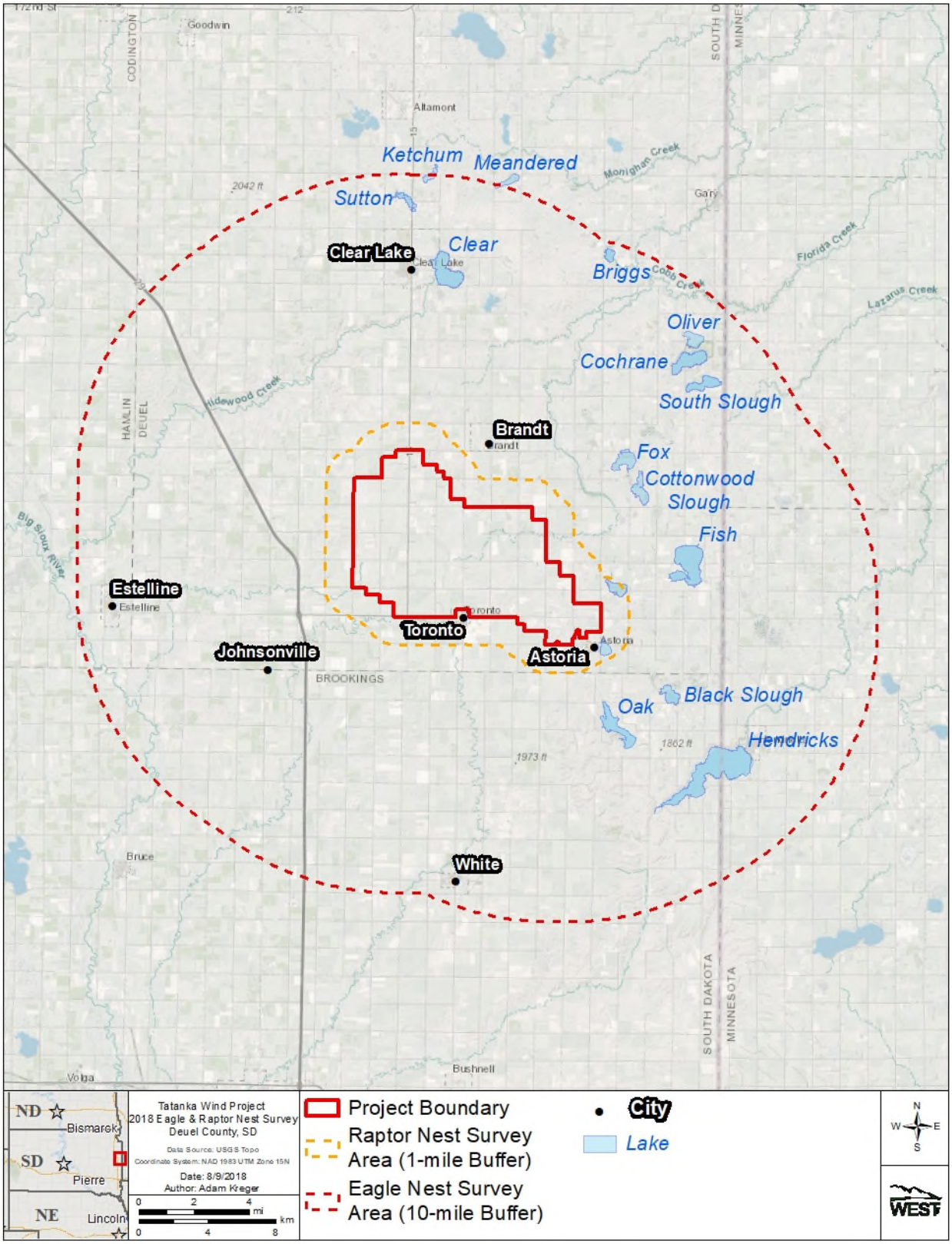


Figure 1. Nest survey area near the Tatanka Wind Project, Deuel County, South Dakota.

Surveys within the Project boundary and 1-mile buffer documented potential raptor nests, including bald eagle nests, while the surveys out to the 10-mile buffer focused only on identifying potential bald eagle nests. Surveys were conducted at the greatest possible distance at which the species could be identified, to minimize disturbances, with distances varying depending upon nest location and wind conditions.

In general, potential bald eagle nest habitat was surveyed by flying meandering transects between 0.25–1.0 mile apart, flying at speeds of approximately 46 miles per hour when actively scanning for nests. Surveys were typically conducted between 07:00 hours and 18:00 hours.

The survey track was recorded using a handheld Global Positioning System (GPS) unit to ensure that areas were adequately covered. The helicopter was positioned to allow a thorough visual inspection of the habitat, and in particular, to provide a view of the tops of the tallest dominant trees, where bald eagles generally prefer to nest (Buehler 2000). The locations of potential raptor and eagle nests were recorded using a handheld GPS. This included all confirmed and potential nests regardless of their activity status.

To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, and presence of eggs, young, whitewash, or fresh building materials. Attempts were made to identify the species of raptor associated with each active nest. Raptor species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

On May 15, 2018, WEST conducted a follow-up aerial survey of bald eagle nests and potential bald eagle nests that were documented in the April survey to confirm species, occupancy and activity status. The follow-up nest checks occurred 33 to 35 days after the initial survey, following ECPG recommendations that eagle nest status be checked at least 30 days after the initial observation.

Terminology

Included below are descriptions of terms used during the documentation of nests (see Results section).

Nest ID – A unique nest identification number was assigned for each nest documented.

Species – A species was assigned to each nest when possible. When a nest could not be identified to species it was classified as an unknown raptor nest. Nests documented as unknown raptor species were defined as any stick nest not having an occupant associated with it at the time of the survey. Unknown raptor species nests, including old/abandoned nests or nests that could be suitable for raptors, were documented in order to populate a nest database to ensure future surveys include all potentially suitable nest sites. Nests documented as belonging to an unknown raptor species that appeared consistent in size and shape with bald eagle nests were further classified as potential alternate nest sites for bald eagles.

Nest Condition – Nest condition was categorized as good, fair, or poor. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site was last used. Nests in good condition were excellently maintained with very well-defined bowls, no sagging, and are either suitable for immediate use or currently in use. Nests in fair condition had fairly well-defined bowls, minor sagging, and appeared to require some repair or maintenance before being suitable for use. Nests in poor condition were sloughing or sagging heavily, and would require effort to restore for successful nesting.

Substrate – Nest substrate was recorded to provide observers with a visual reference to facilitate locating the nest in the future. Substrates may include man-made structures (e.g., power lines, nest platforms, dock hoists), and biological and physical structures (e.g., conifer and deciduous tree species, cliff faces).

Nest Status – Nest status was categorized using definitions consistent with the ECPG. Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position; (2) eggs; (3) nestlings or fledglings; (4) a pair of adults (sometimes sub-adults); (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if: (1) an adult was present on the nest in incubating position; (2) an egg or eggs were present; or (3) nestlings were observed. Nests were classified as inactive if no eggs or chicks were present. Nests not meeting the above criteria for "occupied" were classified as "unoccupied." Bald eagle nests and potential bald eagle nests were further classified as "in-use" or "alternate" based on updated definitions of these terms in the final Eagle Rule, which became effective on January 17, 2017 (Title 50 Code of Federal Regulations Parts 13 and 22, 81 Federal Register 91494).

RESULTS

A total of 31 raptor nests were observed during the aerial surveys in April and May 2018 (Table 1). A total of 16 nests were occupied at the time of the surveys, representing three raptor species; the other 15 nests observed during the survey included one inactive bald eagle nest and 14 nests associated with unidentified raptor species.

Bald Eagles

Four occupied and active bald eagle nests, two occupied inactive bald eagle nests, and one inactive historic bald eagle nest were documented within 10 miles of the Project boundary (Figure 2). The closest bald eagle nest to the Project was Nest 2207, which was documented approximately 3.5 miles southeast of the Project boundary. The other six nests were located between 3.7 and 9.7 miles from the Project boundary. The following discussion provides additional information on the bald eagle nests observed during the surveys.

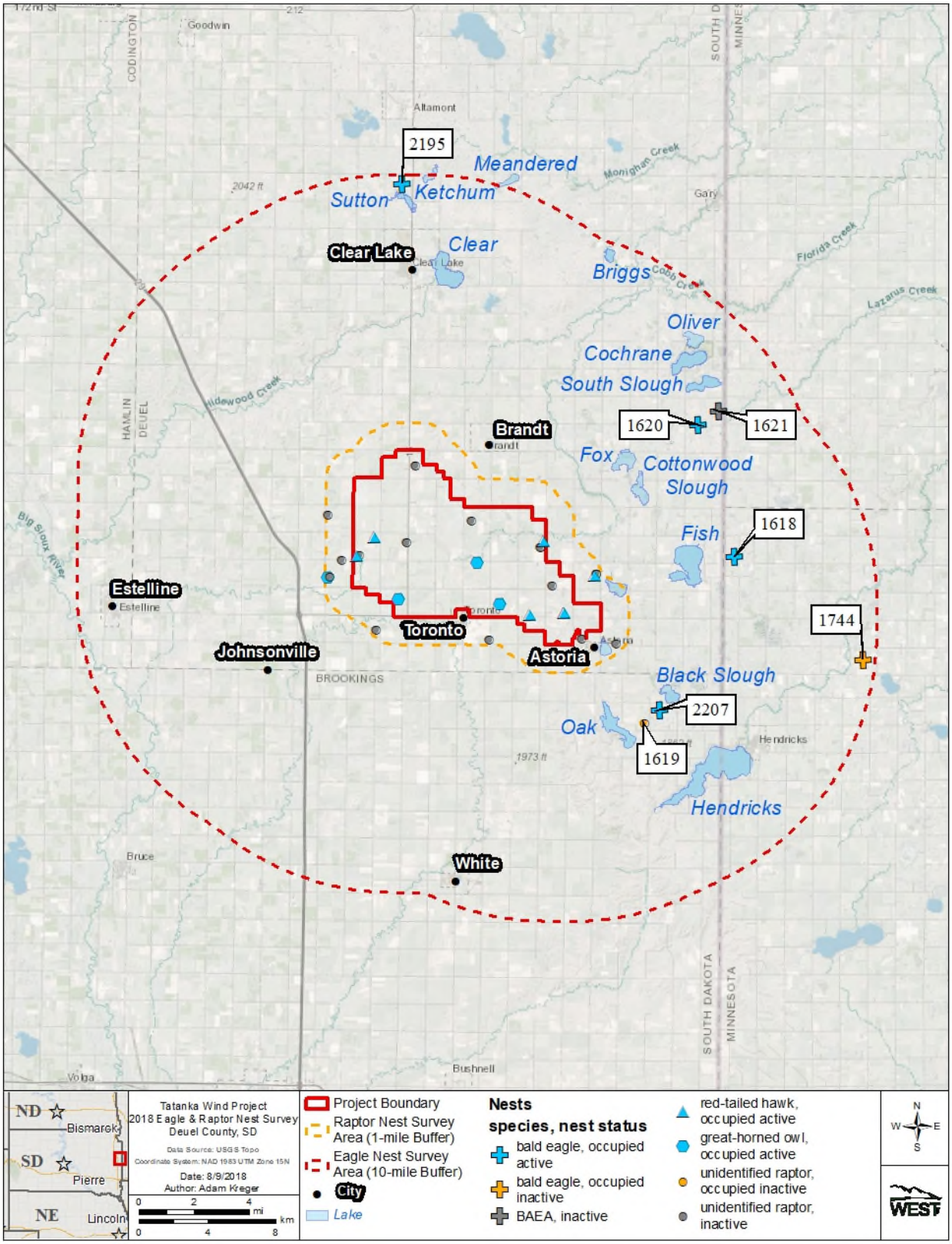


Figure 2. Locations of raptor and eagle nests observed within 10 miles of the Tatanka Wind Project, Deuel County, South Dakota.

Table 1. Raptor nest ID, location, species, status, substrate, and condition during the April and May 2018 surveys for the Tatanka Wind Project, Deuel County, South Dakota.

Species[1]	Distance from Project (miles)[2]	Status at Time of Survey	Nest ID	Condition	Latitude	Longitude	Substrate[3]
BAEA	3.5	in-use, occupied active	2207	good	44.5248	-96.4981	DT
BAEA	3.7	in-use, occupied inactive	1619	good	44.5177	-96.5090	DT
BAEA	5.1	in-use, occupied active	1618	good	44.6048	-96.4439	DT
BAEA	6.5	in-use, occupied active	1620	good	44.6743	-96.4716	DT
BAEA	7.4	alternate, inactive	1621	good	44.6819	-96.4560	DT
BAEA	9.5	in-use, occupied inactive	1744	good	44.5516	-96.3486	DT
BAEA	9.7	in-use, occupied active	2195	good	44.7993	-96.6911	DT
GHOW	0.9	occupied active	2184	good	44.5928	-96.7421	DT
GHOW	0.0	occupied active	2189	good	44.5798	-96.6151	DT
GHOW	0.0	occupied active	2191	good	44.6012	-96.6324	DT
GHOW	0.0	occupied active	2204	good	44.5819	-96.6901	DT
RTHA	0.0	occupied active	2188	good	44.5740	-96.5939	DT
RTHA	0.0	occupied active	2198	good	44.6144	-96.7086	DT
RTHA	0.0	occupied active	2200	good	44.6044	-96.7211	DT
RTHA	0.0	occupied active	3043	good	44.6128	-96.5844	DT
RTHA	0.0	occupied active	3046	good	44.5758	-96.5678	DT
RTHA	0.8	occupied active	3042	good	44.5951	-96.5460	DT
UNRA	0.0	inactive	2187	good	44.6099	-96.5867	DT
UNRA	0.0	inactive	2192	good	44.6521	-96.6793	DT
UNRA	0.0	inactive	2193	good	44.6116	-96.6854	DT
UNRA	0.0	inactive	2194	good	44.6235	-96.6379	DT
UNRA	0.0	inactive	2199	good	44.6046	-96.7199	DT
UNRA	0.0	inactive	3045	fair	44.5897	-96.5784	DT
UNRA	0.0	inactive	3051	fair	44.5618	-96.5560	DT
UNRA	0.5	inactive	2201	good	44.6021	-96.7329	DT
UNRA	0.7	inactive	2206	good	44.5597	-96.5304	DT
UNRA	0.8	inactive	2185	fair	44.5959	-96.5458	DT
UNRA	0.8	inactive	2190	good	44.5611	-96.6240	DT
UNRA	0.8	inactive	2196	good	44.5654	-96.7069	DT
UNRA	0.9	inactive	2203	good	44.5931	-96.7415	DT
UNRA	1.0	inactive	2202	good	44.6260	-96.7430	DT

1 BAEA = bald eagle (*Haliaeetus leucocephalus)*, RTHA = red-tailed hawk (*Buteo jamaicensis)*, GHOW = great-horned owl (*Bubo virginianus)*, UNRA = unidentified species

2 A distance value of 0.0 indicates the nest is located within the Project boundary.

3 DT = deciduous tree

Nest 2207 – This nest was located approximately 3.5 miles southeast of the Project boundary. The nest was in good condition. An adult bald eagle was present on the nest and in incubating position at the time of the survey in April. The nest was still occupied and active with one adult eagle and one chick on the nest at the time of the status check survey in May. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018 (Appendix A, Photograph A-1).

Nest 1619 – This nest was located approximately 3.7 miles southeast of the Project boundary. This nest was documented by WEST as an active eagle nest in 2017 (WEST 2017a). During the

2018 surveys, the nest was in good condition. No eagles were observed on the nest, but the nest appeared to have been recently tended at the time of the survey in April. The nest was inactive with no signs of recent use at the time of the status check survey in May. The nest was therefore classified as an in-use eagle nest, which was occupied and inactive in 2018 (Appendix A, Photograph A-2).

Nest 1618 – This nest was located approximately 5.1 miles east of the Project boundary in Lincoln County, Minnesota. This nest was documented by WEST as an active eagle nest in 2017 (WEST 2017a). During the 2018 surveys, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April. The nest was still occupied and active with one adult and two chicks on the nest at the time of the status check survey in May. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018 (Appendix A, Photograph A-3).

Nest 1620 – This nest was located approximately 6.5 miles northeast of the Project boundary. This nest was documented by WEST as an active eagle nest in 2017 (WEST 2017b). During the 2018 surveys, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April. The nest was still occupied and active at the time of the status check survey in May with one adult and two chicks on the nest. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018 (Appendix A, Photograph A-4).

Nest 1621 – This nest was located approximately 7.4 miles northeast of the Project boundary. This nest was documented by WEST as an active great-horned owl (*Bubo virginianus*) nest in 2017 and as an active bald eagle nest in 2016 (Simon et al. 2016, WEST 2017b). During the 2018 surveys, the nest was in good condition. No eagles were observed on the nest and there was no evidence of recent use at the time of the survey in April. The nest was still inactive at the time of the status check survey in May. The nest may be an alternate nest for the nesting pair at Nest 1620, and was considered inactive in 2018 (Appendix A, Photograph A-5).

Nest 1744 – This nest was located approximately 9.5 miles east of the Project boundary in Lincoln County, Minnesota. This nest was documented by WEST as an active eagle nest in 2017 (WEST 2017a). During the 2018 surveys, the nest was in good condition. An adult bald eagle was seen flying near the nest, and the nest appeared recently tended at the time of the survey in April. The nest was still occupied and active with two adults and two chicks on the nest at the time of the status check survey in May. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018 (Appendix A, Photograph A-6).

Nest 2195 – This nest was located approximately 9.7 miles north of the Project boundary. The nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April. The nest was still occupied and active with two adult eagles and one chick on the nest at the time of the status check survey in May. The nest was therefore considered an in-use occupied and active nest in 2018 (Appendix A, Photograph A-7).

Other Raptors

A total of 24 additional raptor nests were documented during the surveys (Table 1; Figure 3), which included the following:

- Occupied and active
  - 6 red-tailed hawk (*Buteo jamaicensis*) nests
  - 4 great horned owl nests
- Unoccupied and inactive nests
  - 14 unoccupied and inactive nests of unidentified species

Fourteen of the 24 raptor nests observed in the 2018 surveys were documented within the Project boundary, including eight occupied nests. Of the occupied nests, five were active red-tailed hawk nests and three were active great horned owl nests. The six unoccupied nests within the Project boundary included five nests in good condition and one nest in fair condition.

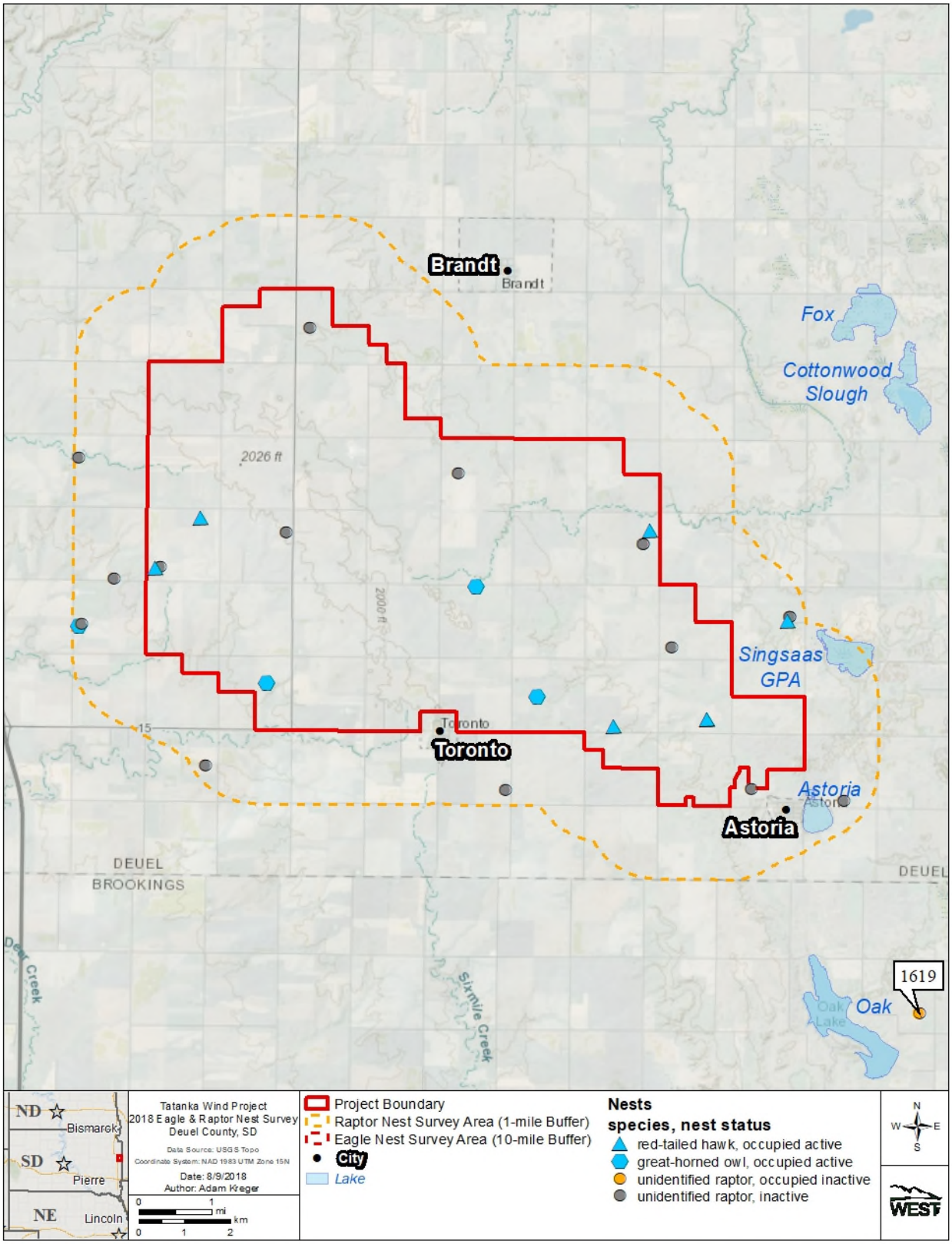


Figure 3. Locations of raptor nests observed within one mile of the Tatanka Wind Project, Deuel County, South Dakota.

LITERATURE CITED

50 Code of Federal Regulations (CFR) 13. 1974. Title 50 - Wildlife and Fisheries; Chapter I - United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 13 - General Permit Procedures. 50 CFR 13. [39 Federal Register (FR) 1161, January 4, 1974. 16 United States Code (USC) 668a, 704, 712, 742j-1, 1382, 1538(d), 1539, 1540(f), 3374, 4901-4916; 18 USC 42; 19 USC 1202; Executive Order (EO) 11911, 41 FR 15683; 31 USC 9701.].

50 Code of Federal Regulations (CFR) 22. 1974. Title 50 - Wildlife and Fisheries; Chapter I - United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits. 50 CFR 22. [39 Federal Register (FR) 1183, January 4, 1974, unless otherwise noted. 16 United States Code (USC) 668-668d; 16 USC 703-712; 16 USC 1531-1544].

Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). P. G. Rodewald, ed. The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York. Retrieved from the Birds of North America Online: https://birdsna.org/Species-Account/bna/species/baleag ; doi: 10.2173/bna.506

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. US Fish and Wildlife Service (USFWS). February 2010. Available online: http://steinadlerschutz.lbv.de/fileadmin/www.steinadlerschutz.de/terimGoldenEagle TechnicalGuidanceProtocols25March2010_1_.pdf

Simon, S., S. Agudelo, and T. Mattson. 2017. Raptor Nest Survey Bitter Root Wind Energy Project, Yellow Medicine County, Minnesota, and Deuel County, South Dakota. Final Report: March 28 – 31, 2016. Prepared for Flying Cow Wind, LLC, at the request of Global Winds Harvest, Inc., Schenectady, New York. Prepared by Western EcoSystems Technology, Inc. (WEST). Golden Valley, Minnesota. Available online: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={80E8A25F-0000-CF78-8037-12DD964D3686}&documentTitle=201711-137277-08

US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplan guidance.pdf

US Geological Survey (USGS). 2018. USGS Topographic Maps. Accessed January 17, 2018. Information online: https://nationalmap.gov/ustopo/index.html

Western EcoSystems Technology, Inc. (WEST). 2017a. Eagle and Raptor Nest Survey Report, Coyote Ridge Wind Project, Brookings County, South Dakota. April 5-8, and May 24, 2017. Prepared for Coyote Ridge Wind, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. June 8, 2018.

Western EcoSystems Technology, Inc. (WEST). 2017b. Raptor Nest Survey Report for the Bitter Root Wind Energy Project, Yellow Medicine County, Minnesota and Deuel County, South Dakota. Prepared for Flying Cow Wind, LLC; Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. September 30, 2017. Available online: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={80E8A25F-0000-CF78-8037-12DD964D3686}&documentTitle=201711-137277-08

Appendix A. Photographs of Bald Eagle Nests Documented in April and May 2018 within 10 Miles of the Tatanka Wind Project

Appendix A, Photograph A-1. Nest 2207 was located approximately 3.5 miles southeast of the Project boundary. The nest was in good condition. An adult bald eagle was present on the nest and in incubating position at the time of the survey in April. The nest was still occupied and active with one adult eagle and one chick on the nest at the time of the status check survey in May. The nest was classified as an in-use eagle nest, which was occupied and active in 2018.

Appendix A, Photograph A-2. Nest 1619 was located approximately 3.7 miles southeast of the Project boundary. The nest was in good condition. No eagles were observed on the nest, but the nest appeared to have been recently tended at the time of the survey in April. The nest was inactive with no signs of recent use at the time of the status check survey in May. The nest was classified as an in-use eagle nest, which was occupied and inactive in 2018.

Appendix A, Photograph A-3. Nest 1618 was located approximately 5.1 miles east of the Project boundary. The nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April. The nest was still occupied and active with one adult and two chicks on the nest at the time of the status check survey in May. The nest was classified as an in-use eagle nest, which was occupied and active in 2018.

Appendix A, Photograph A-4. Nest 1620 was located approximately 6.5 miles northeast of the Project boundary. The nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April. The nest was still occupied and active at the time of the status check survey in May with one adult and two chicks on the nest. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018.

Appendix A, Photograph A-5. Nest 1621 was located approximately 7.4 miles northeast of the Project boundary. This nest was documented by WEST as an active great-horned owl (*Bubo virginianus*) nest in 2017 and as an active bald eagle nest in 2016. During the 2018 surveys, the nest was in good condition. No eagles were observed on the nest and there was no evidence of recent use at the time of the survey in April. The nest was still inactive at the time of the status check survey in May. The nest may be an alternate nest for the nesting pair at Nest 1620, and was considered inactive in 2018.

Appendix A, Photograph A-6. Nest 1744 was located approximately 9.5 miles east of the Project boundary. The nest was in good condition. An adult bald eagle was seen flying near the nest, and the nest appeared recently tended at the time of the survey in April. The nest was still occupied and active with two adults and two chicks on the nest at the time of the status check survey in May. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018.

Appendix A, Photograph A-7. Nest 2195 was located approximately 9.7 miles north of the Project boundary. The nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey. The nest was therefore classified as an in-use eagle nest, which was occupied and active in 2018.

2019 Eagle and Raptor Nest Survey Report

Tatanka Ridge Wind Project

Deuel County, South Dakota

Prepared for:

Tatanka Ridge Wind, LLC

1125 Northwest Couch Street
Portland, Oregon 97209

Prepared by:

Alaini Schneider Cossette, Cecily Foo, and Janelle Rieland

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, Minnesota 55427

June 6, 2019

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Janelle Rieland	Project Manager
Cecily Foo	Field Coordinator
Alaini Schneider Cossette	Biologist
Grady Kragenbring	Surveyor
Martin Viereckl	GIS Specialist
Carmen Boyd	Project Tracking and Data Manager
Andrea Palochak	Technical Editor

REPORT REFERENCE

Cossette, A. S., C. Foo, and J. Rieland. 2019. 2019 Eagle and Raptor Nest Survey Report, Tatanka Ridge Wind Project, Deuel County, South Dakota. Prepared for Tatanka Ridge Wind, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. June 6, 2019. 11 pp. + appendices.

TABLE OF CONTENTS

INTRODUCTION 1
SURVEY AREA 1
METHODS 3
Aerial Raptor Nest Survey 3
Terminology 4
RESULTS 5
Bald Eagle Nests, and Nests Consistent in Size and Shape with Bald Eagle Nests 5
Other Raptors 9
LITERATURE CITED 11

LIST OF TABLES

Table 1. Raptor nest ID, species, distance from Project, status, condition, location, and substrate documented during the April 2019 survey for the Tatanka Ridge Wind Project, Deuel County, South Dakota. 6

LIST OF FIGURES

Figure 1. Location of the Tatanka Ridge Wind Project, Deuel County, South Dakota. 2
Figure 2. Locations of raptor nests within 1-mile and eagle-sized nests within 10 miles of the Tatanka Ridge Wind Project or otherwise checked for nest status during the 2019 aerial nest survey, Deuel County, South Dakota. 7
Figure 3. Locations of raptor nests observed within 1-mile of the Tatanka Ridge Wind Project during the 2019 aerial nest survey, Deuel County, South Dakota. 10

LIST OF APPENDICES

Appendix A. Photographs of Bald Eagle Nests and Nests Consistent in Size and Shape with Bald Eagle Nests Documented during the Aerial Nest Survey at the Tatanka Ridge Wind Project in April 2019

NOTES ON UNITS

Imperial units are used throughout this document. Conversions to metric units are provided below.

Unit Conversions

Imperial	Metric
1 foot	0.3048 meter
3.28 feet	1 meter
1 mile	1.61 kilometers
0.621 mile	1 kilometer
1 acre	0.40 hectare
2.47 acres	1 hectare

Common Conversions

Imperial	Metric
0.12 mile	200 meters
0.5 mile	800 meters
10 miles	16.1 kilometers

INTRODUCTION

Tatanka Ridge Wind, LLC (Tatanka Ridge Wind), a wholly owned subsidiary of Avangrid Renewables, LLC, has proposed development of the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota (Figure 1). At Tatanka Ridge Wind's request, Western EcoSystems Technology, Inc. (WEST) conducted an aerial raptor nest survey to record the location and status of bald eagle (*Haliaeetus leucocephalus*) and other raptor nests in and near the Project. The aerial survey was conducted in accordance with the guidance provided in the US Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). This report provides results of the eagle and raptor nest survey conducted in April 2019.

In January of 2019, the Project boundary was modified and shifted to the northwest. The 2019 aerial nest survey served as both a second year check of eagle nests that were documented within 10 miles of the 2018 Project boundary during the 2018 aerial nest survey, and to document raptor and eagle nests within the associated survey buffers of the updated 2019 Project boundary. The 2019 survey area also overlapped with areas surveyed for the Bitter Root Wind Energy Project aerial nest surveys in 2016 and 2017 (Simon et al. 2017; WEST 2017a) and the Coyote Ridge Wind Project aerial nest survey in 2017 (WEST 2017b).

SURVEY AREA

The Project boundary encompasses an area of approximately 27,850 acres (44 square miles) located approximately 6 miles west of the South Dakota/Minnesota border, and directly north of the town of Toronto, South Dakota (Figure 1). The survey area for all raptor stick nests consisted of a 1-mile buffer of the Project boundary. The survey area for bald eagle nests consisted of a focused 2-mile buffer of the Project boundary as well as areas within 10 miles of the Project boundary that were not included in the 2018 aerial raptor nest survey (Kreger and Rieland 2018). Observers checked the nest status for all nests documented during the 2018 raptor nest survey that were consistent in size and shape with eagle nests.

The majority of the survey area consists of cultivated agricultural fields and some pastureland, with limited potential substrates for bald eagle and other raptor nests. Wooded habitat within the Project boundary is mainly in the form of relatively small woodlots associated with rural homesteads and shelterbelts. Wooded areas associated with larger lakes located outside of the Project and within the 10-mile buffer may provide more suitable nesting substrate than that found within the Project boundary.

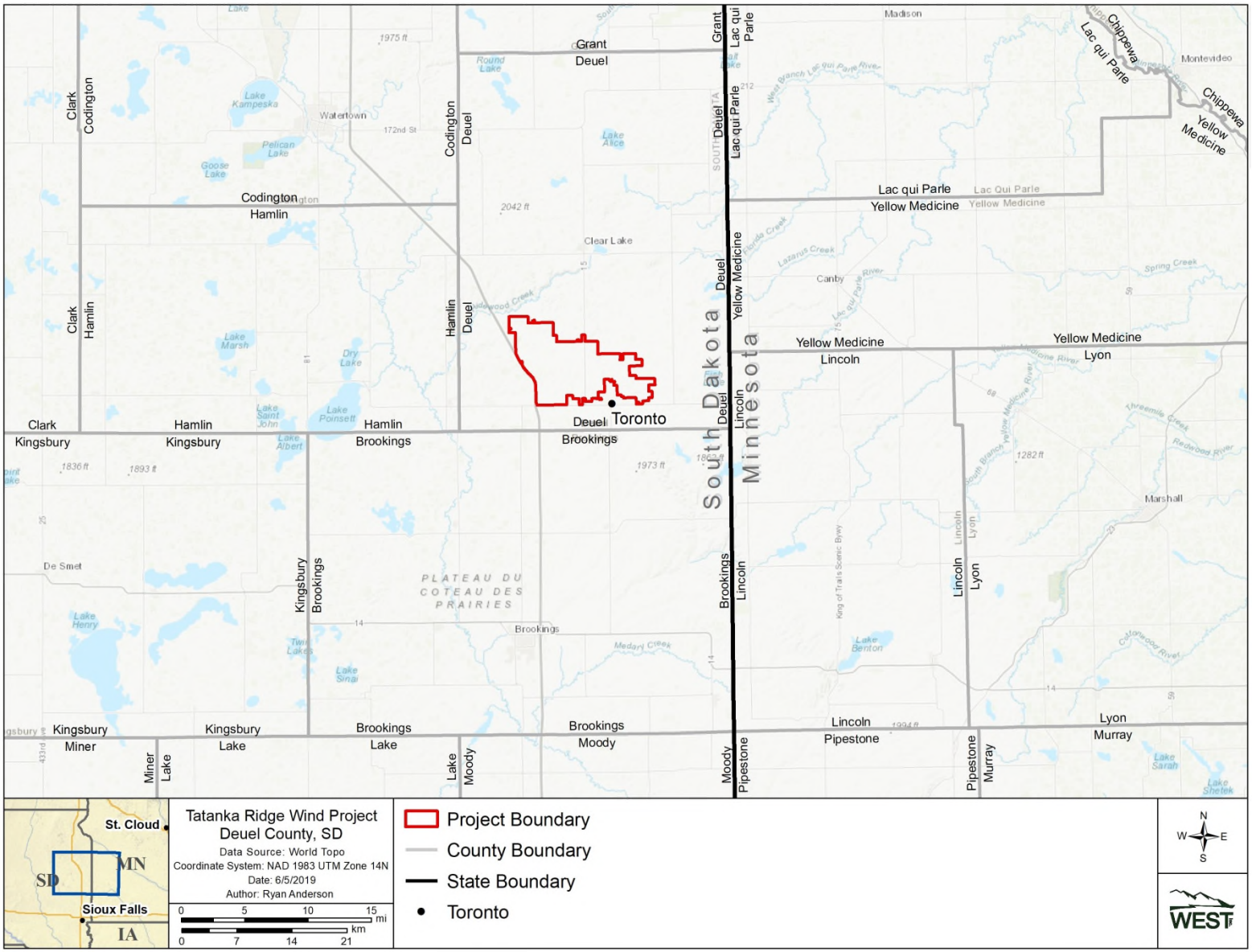


Figure 1. Location of the Tatanka Ridge Wind Project, Deuel County, South Dakota.

METHODS

Aerial Raptor Nest Survey

The aerial survey was conducted from a helicopter in early April (April 2 – 3, 2019), a period before leaf out when raptors and eagles would be actively tending to a nest or incubating eggs. The aerial survey was conducted in accordance with the guidance provided in the ECPG (USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). An experienced raptor biologist and a skilled helicopter pilot conducted the survey. Raptors were defined for this survey as kites, accipiters, buteos, harriers, eagles, falcons, and owls (Buehler 2000). The main focus of the survey was to identify bald eagle and raptor nests and to determine nest activity. Surveyors focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (e.g., trees, transmission lines) within and around the Project. Pre-flight planning included the creation of field maps and mobile Geographic Information System files, and review of relevant background information, such as previously recorded nest locations, topographic maps, and aerial photographs.

The portion of the survey within the Project boundary and 1-mile buffer documented potential raptor nests, including bald eagle nests, while the survey out to the 2-mile buffer and the areas within 10 miles of the Project that were not previously surveyed focused only on identifying potential bald eagle nests. All nests consistent in size and shape with eagle nests that were documented in the 2018 raptor nest survey were checked for nest status in 2019. The survey was conducted at the greatest possible distance at which the species could be identified, to minimize disturbances, with distances varying depending upon nest location and wind conditions.

In general, potential bald eagle nest habitat was surveyed by flying meandering transects between 0.25–1.0 mile apart, flying at speeds of approximately 50 miles per hour when actively scanning for nests. The survey was conducted between 11:00 hours and 19:15 hours.

The survey track was recorded using a handheld Global Positioning System (GPS) unit to ensure that areas were adequately covered. The helicopter was positioned to allow a thorough visual inspection of the habitat, and in particular, to provide a view of the tops of the tallest dominant trees, where bald eagles generally prefer to nest (Buehler 2000). The locations of potential raptor and eagle nests were recorded using a handheld GPS. This included all confirmed and potential nests regardless of their activity status.

To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, and presence of eggs, young, whitewash, or fresh building materials. Attempts were made to identify the species of raptor associated with each active nest. Raptor species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

Terminology

Included below are descriptions of terms used during the documentation of nests (see Results section).

Nest ID – A unique nest identification number was assigned for each nest documented.

Species – A species was assigned to each nest when possible. When a nest could not be identified to species it was classified as an unidentified raptor nest. Nests documented as unidentified raptor species were defined as any stick nest not having an occupant associated with it at the time of the survey. Unidentified raptor species nests, including old/abandoned nests or nests that could be suitable for raptors, were documented in order to populate a nest database to ensure future surveys include all potentially suitable nest sites. Nests documented as belonging to an unidentified raptor species that appeared consistent in size and shape with bald eagle nests were further classified as potential alternate nest sites for bald eagles.

Nest Condition – Nest condition was categorized as good, fair, or poor. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site was last used. Nests in good condition were excellently maintained with well-defined bowls, no sagging, and were either suitable for immediate use or currently in use. Nests in fair condition had fairly well-defined bowls, minor sagging, and appeared to require some repair or maintenance before being suitable for use. Nests in poor condition were sloughing or sagging heavily, and would require effort to restore for successful nesting.

Substrate – Nest substrate was recorded to provide observers with a visual reference to facilitate locating the nest in the future. Substrates could include man-made structures (e.g., power lines, nest platforms, dock hoists), and biological and physical structures (e.g., conifer and deciduous tree species, cliff faces).

Nest Status – Nest status was categorized using definitions originally proposed by Postupalsky (1974) and largely followed today (ECPG 2013). Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position, (2) eggs, (3) nestlings or fledglings, (4) presence of an adult (sometimes sub-adults), (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season, or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if: (1) an adult was present on the nest in incubating position, (2) an egg or eggs were present, or (3) nestlings were observed. Occupied nests were classified as inactive if adults were not observed in a brooding position and no eggs or chicks were present. Nests not meeting the above criteria for “occupied” were classified as “inactive.”

RESULTS

A total of 36 nests representing three identifiable species were recorded during the 2019 aerial nest survey (Figure 2, Table 1). Seven nests were identified as occupied and active bald eagle nests, one nest was identified as being an occupied inactive bald eagle nest, and one nest was identified as being consistent in size and shape with bald eagle nests (but was occupied during the survey by a great horned owl [*Bubo virginianus*]). A total of 27 raptor nests were observed within 1-mile of the Project during the aerial survey in April 2019 (Figure 3, Table 1). Five of these 27 nests were occupied and active at the time of the survey and the remaining 22 nests observed within 1-mile of the Project during the survey were inactive.

Bald Eagle Nests, and Nests Consistent in Size and Shape with Bald Eagle Nests

A total of nine nests were identified as being consistent in size and shape with bald eagle nests during the 2019 aerial survey. Seven occupied and active bald eagle nests and one occupied inactive bald eagle nest were documented within 10 miles of the Project boundary (Figure 2); in addition, one occupied active great horned owl nest was identified 7.8 miles northeast of the Project boundary (Nest 1621); this nest was recorded in 2018 as an inactive bald eagle nest. The closest bald eagle nests to the Project were Nest 2207 and Nest 1619, which were both documented 5.4 miles southeast of the Project boundary; Nest 2207 was occupied and active whereas Nest 1619 was occupied and inactive in 2019. The other six nests were located between 6.3 and 11.4 miles from the Project boundary. Nest 1744, which was 11.4 miles from the current Project boundary, was recorded as an occupied and inactive bald eagle nest in 2018. The following discussion provides additional information on the bald eagle nests observed during the survey.

Nest 2207 – This nest was located 5.4 miles southeast of the Project boundary. This nest was documented by WEST as an occupied and active bald eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. No adult bald eagles were present on the nest, but two eggs were observed in the nest and the nest appeared to have been recently tended at the time of the survey in April. The nest was therefore classified as an occupied active bald eagle nest in 2019 (Appendix A, Photograph A-1).

Nest 1619 – This nest was located 5.4 miles southeast of the Project boundary, approximately 0.73 mile from Nest 2207. This nest was documented by WEST as an active bald eagle nest in 2017 (WEST 2017a), and as an occupied inactive bald eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. Two adult eagles were observed perched on the nest and the nest appeared to have been recently tended; however, no eggs, chicks, or signs of incubating or brooding were observed. The nest was therefore classified as an occupied and inactive bald eagle nest in 2019 (Appendix A, Photograph A-2). It is possible that the two eagles observed at this nest were actively nesting at nearby Nest 2207.

Table 1. Raptor nest ID, species, distance from Project, status, condition, location, and substrate documented during the April 2019 survey for the Tatanka Ridge Wind Project, Deuel County, South Dakota.

Species[1]	Distance from Project (miles)[2]	Status at Time of Survey	Nest ID	Condition	Latitude	Longitude	Substrate[3]
BAEA	5.4	occupied active	2207	good	-96.4980	44.5247	DT
BAEA	5.4	occupied inactive	1619	good	-96.5089	44.5177	DT
BAEA	6.3	occupied active	1618	good	-96.4439	44.6053	DT
BAEA	6.9	occupied active	1620	good	-96.4715	44.6742	DT
BAEA	7.7	occupied active	14384	good	-96.9308	44.5769	DT
BAEA	9.4	occupied active	2195	good	-96.6911	44.7993	DT
BAEA	9.8	occupied active	14383	good	-96.9985	44.6273	DT
BAEA	11.4	occupied active	1744	good	-96.3485	44.5515	DT
GHOW[4]	7.8	occupied active	1621	good	-96.4561	44.6819	DT
GHOW	0.0	occupied active	2200	good	-96.7210	44.6043	DT
RTHA	0.0	occupied active	14387	good	-96.7712	44.6146	DT
RTHA	0.0	occupied active	2194	good	-96.6379	44.6235	DT
RTHA	<0.1	occupied active	2189	good	-96.6151	44.5797	DT
UNRA	0.0	occupied active	2198	good	-96.7086	44.6144	DT
UNRA	0.0	inactive	2184	good	-96.7420	44.5927	DT
UNRA	0.0	inactive	2193	fair	-96.6853	44.6116	DT
UNRA	0.0	inactive	2199	poor	-96.7198	44.6046	DT
UNRA	0.0	inactive	2201	good	-96.7328	44.6021	DT
UNRA	0.0	inactive	2202	fair	-96.7430	44.6260	DT
UNRA	0.0	inactive	2203	fair	-96.7415	44.5931	DT
UNRA	0.0	inactive	2204	good	-96.6900	44.5818	DT
UNRA	0.0	inactive	14385	good	-96.8038	44.6609	DT
UNRA	0.0	inactive	14386	good	-96.7806	44.6251	DT
UNRA	0.0	inactive	14388	good	-96.7707	44.6310	DT
UNRA	0.0	inactive	14389	good	-96.7737	44.6588	DT
UNRA	0.0	inactive	14390	good	-96.7559	44.5926	DT
UNRA	0.0	inactive	14391	good	-96.7324	44.5870	DT
UNRA	0.0	inactive	14392	good	-96.6865	44.6395	DT
UNRA	0.0	inactive	14393	good	-96.6738	44.5945	DT
UNRA	0.2	inactive	3045	good	-96.5783	44.5896	DT
UNRA	0.3	inactive	14394	good	-96.5992	44.6117	DT
UNRA	0.5	inactive	2186	good	-96.5682	44.5754	DT
UNRA	0.5	inactive	2187	good	-96.5866	44.6099	DT
UNRA	0.5	inactive	3043	good	-96.5843	44.6127	DT
UNRA	0.6	inactive	2196	fair	-96.7069	44.5654	DT
UNRA	0.8	inactive	2197	good	-96.7078	44.5619	DT

[1] BAEA = bald eagle (*Haliaeetus leucocephalus*), RTHA = red-tailed hawk (*Buteo jamaicensis*), GHOW = great horned owl (*Bubo virginianus*), UNRA = unidentified raptor species

[2] A distance value of 0.0 indicates the nest is located within the Project boundary.

[3] DT = deciduous tree

[4] Nest is consistent in size and shape with a bald eagle nest, but was occupied by a different raptor species

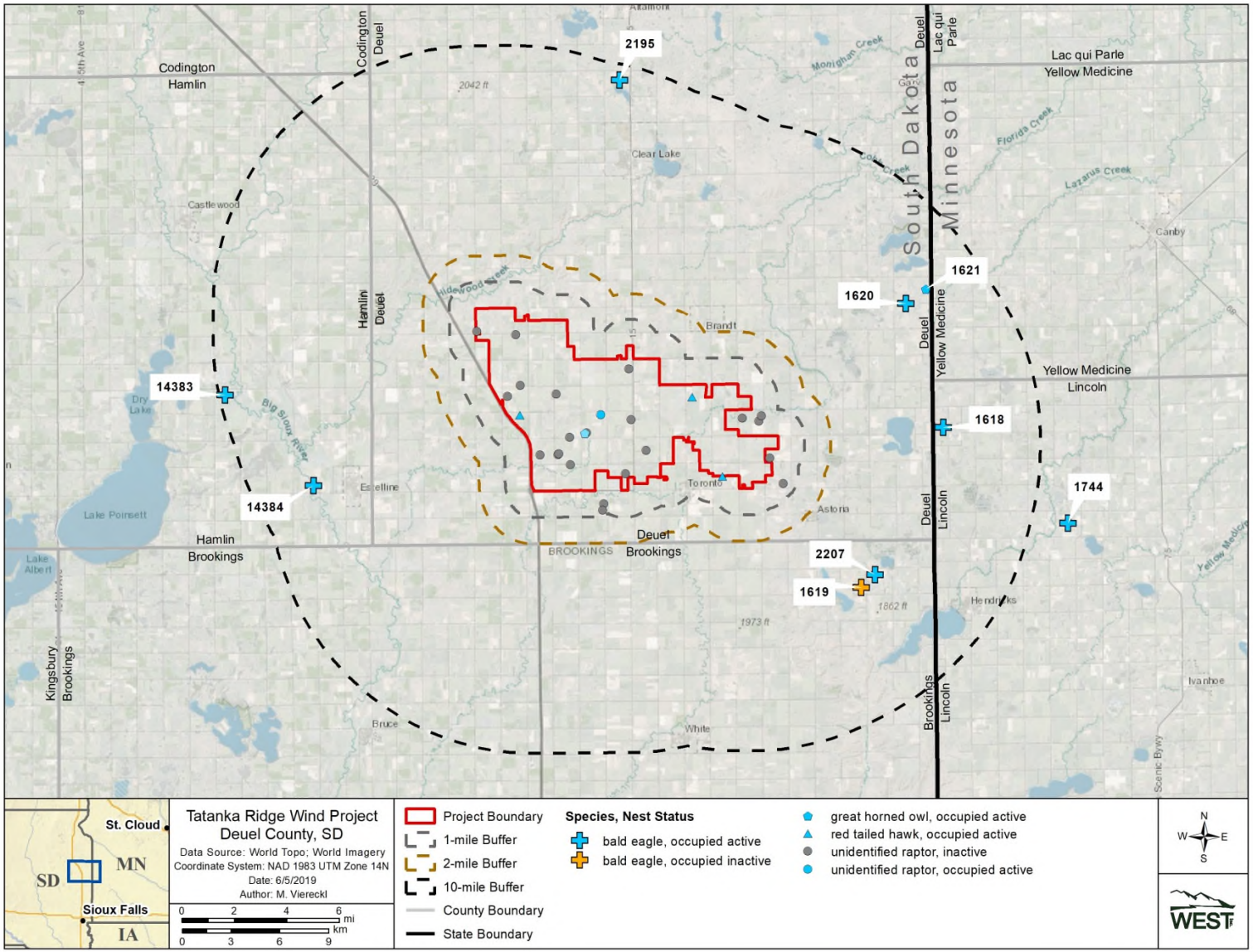


Figure 2. Locations of raptor nests within 1-mile and eagle-sized nests within 10 miles of the Tatanka Ridge Wind Project or otherwise checked for nest status during the 2019 aerial nest survey, Deuel County, South Dakota.

Nest 1618 – This nest was located 6.3 miles east of the Project boundary in Lincoln County, Minnesota. This nest was documented by WEST as an active bald eagle nest in 2017 (WEST 2017a), and as an occupied active bald eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019 (Appendix A, Photograph A-3).

Nest 1620 – This nest was located 6.9 miles northeast of the Project boundary. This nest was documented by WEST as an active eagle nest in 2017 (WEST 2017b), and as an occupied and active eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019 (Appendix A, Photograph A-4).

Nest 14384 – This nest was located 7.7 miles west of the Project boundary. This nest was located for the first time in 2019 and was in good condition. Two adult bald eagles were observed; one was perched nearby and the other was incubating on the nest at the time of the survey in April. The nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019 (Appendix A, Photograph A-5).

Nest 2195 – This nest was located 9.4 miles north of the Project boundary. This nest was documented by WEST as an occupied active eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore considered an occupied and active bald eagle nest in 2019 (Appendix A, Photograph A-6).

Nest 14383 – This nest was located 9.8 miles west of the Project boundary. This nest was located for the first time in 2019 and was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019 (Appendix A, Photograph A-7).

Nest 1744 – This nest was located 11.4 miles east of the Project boundary in Lincoln County, Minnesota. This nest was documented by WEST as an active eagle nest in 2017 (WEST 2017a), and as an occupied inactive eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest, and the nest appeared to have been recently tended at the time of the survey in April. The nest was therefore classified as an occupied and active bald eagle nest in 2019 (Appendix A, Photograph A-8).

Nest 1621 – This nest was located 7.8 miles northeast of the Project boundary. This nest was documented by WEST as an active bald eagle nest in 2016 (Simon et al. 2017), as an active great

horned owl nest in 2017 (WEST 2017b), and as an inactive bald eagle nest in 2018 (Kreger and Rieland 2018). During the 2019 survey, the nest was in good condition. No eagles were observed on the nest. An adult great horned owl was observed incubating on the nest, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied active great horned owl nest in 2019; however, based on the previous classifications, this nest is likely an alternate bald eagle nest that has the potential to be occupied by bald eagles in future years (Appendix A, Photograph A-9).

Other Raptors

A total of 28 non-eagle raptor nests were documented during the aerial nest survey, 27 of which were within 1-mile of the Project (Table 1; Figure 2; Figure 3). Nest 1621, as described above, was documented as an occupied active great horned owl nest approximately 7.8 miles northeast of the Project boundary, and was consistent in size and shape with a bald eagle nest. The 27 raptor nests within 1-mile of the Project include the following:

- Occupied and active
    - three red-tailed hawk (*Buteo jamaicensis*) nests
    - one great horned owl nest
    - one unidentified raptor nest
- Inactive nests
    - 22 inactive nests of unidentified raptor species

Nineteen of the 27 raptor nests observed within 1-mile of the Project during the 2019 survey were documented within the Project boundary, including four occupied nests that were reported in good condition. Of the occupied nests, two were active red-tailed hawk nests, one was an active great horned owl nest, and one was an active unidentified raptor nest. The 15 inactive nests within the Project boundary included 11 nests in good condition, three nests in fair condition, and one nest in poor condition.

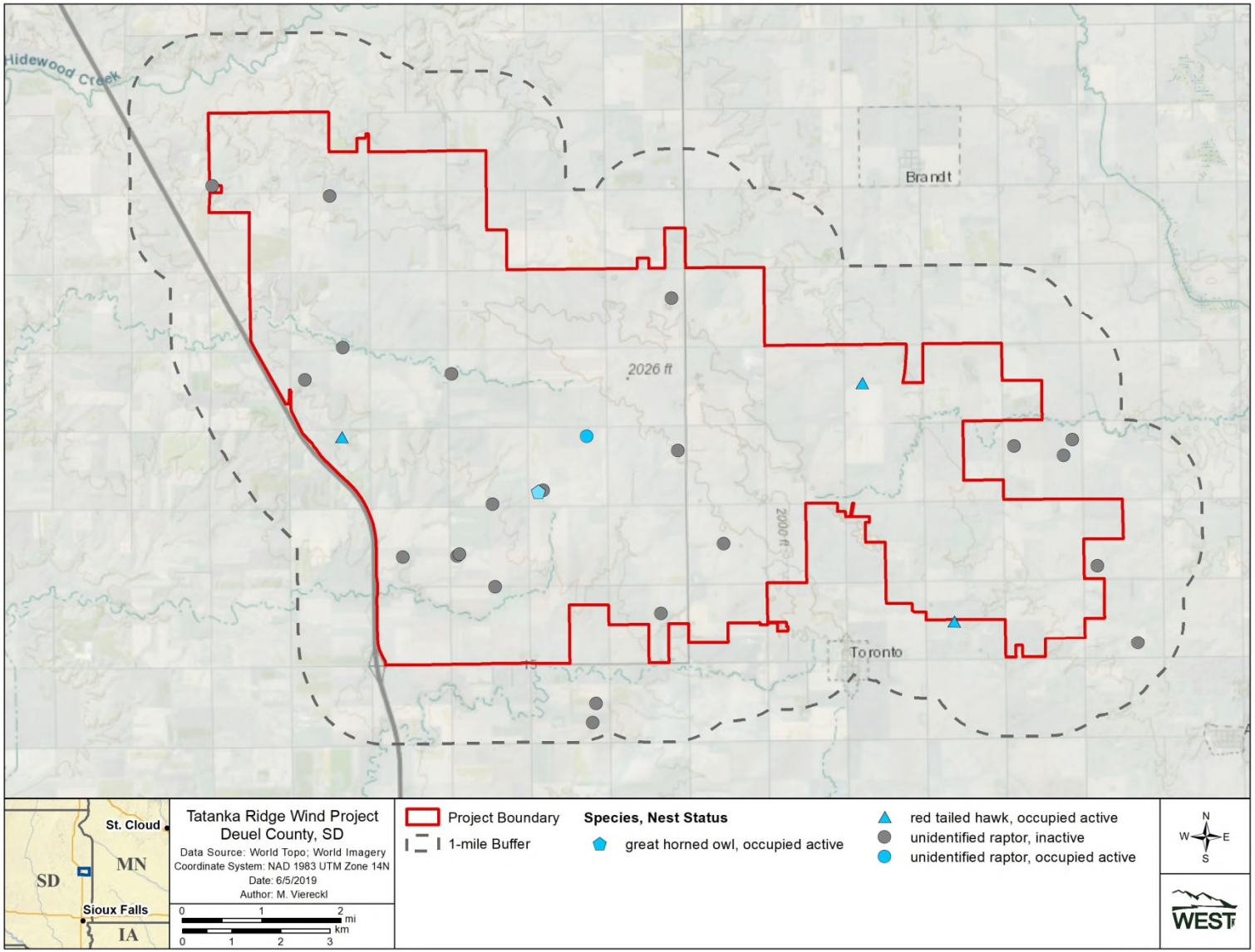


Figure 3. Locations of raptor nests observed within 1-mile of the Tatanka Ridge Wind Project during the 2019 aerial nest survey, Deuel County, South Dakota.

LITERATURE CITED

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*), Version 2.0. P. G. Rodewald, ed. *In:* The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. doi: 10.2173/bna.506. Retrieved from the Birds of North America Online: https://birdsna.org/Species-Account/bna/species/baleag

ESRI. 2019. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (ESRI), producers of ArcGIS software. Redlands, California. Information online: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

Kreger, A. and J. Rieland. 2018. 2018 Eagle and Raptor Nest Survey Report, Tatanka Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III Wind, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. August 10, 2018.

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. US Fish and Wildlife Service (USFWS). February 2010. Available online: http://steinadlerschutz.lbv.de/fileadmin/www.steinadlerschutz.de/terimGoldenEagleTechnicalGuidanceProtocols25March2010_1_.pdf

Postupalsky, S. 1974. Raptor reproductive success: some problems with methods, criteria and terminology. Management of raptors. Raptor Research Foundation, Vermillion, South Dakota, USA.

Simon, S., S. Agudelo, and T. Mattson. 2017. Raptor Nest Survey Bitter Root Wind Energy Project, Yellow Medicine County, Minnesota, and Deuel County, South Dakota. Final Report: March 28 – 31, 2016. Prepared for Flying Cow Wind, LLC, at the request of Global Winds Harvest, Inc., Schenectady, New York. Prepared by Western EcoSystems Technology, Inc. (WEST). Golden Valley, Minnesota.

US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplan guidance.pdf

Western EcoSystems Technology, Inc. (WEST). 2017a. Raptor Nest Survey Report for the Bitter Root Wind Energy Project, Yellow Medicine County, Minnesota and Deuel County, South Dakota. Prepared for Flying Cow Wind, LLC; Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. September 30, 2017. Available online: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={80E8A25F-0000-CF78-8037-12DD964D3686}&documentTitle=201711-137277-08

Western EcoSystems Technology, Inc. (WEST). 2017b. Eagle and Raptor Nest Survey Report, Coyote Ridge Wind Project, Brookings County, South Dakota. April 5-8, and May 24, 2017. Prepared for Coyote Ridge Wind, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. June 8, 2018.

Appendix A. Photographs of Bald Eagle Nests and Nests Consistent in Size and Shape with Bald Eagle Nests Documented during the Aerial Nest Survey at the Tatanka Ridge Wind Project in April 2019

Appendix A, Photograph A-1. Nest 2207 was located approximately 5.4 miles southeast of the Project boundary. During the 2019 survey, the nest was in good condition. No adult bald eagles were present on the nest, but two eggs were observed in the nest and the nest appeared to have been recently tended at the time of the survey in April. The nest was therefore classified as an occupied active bald eagle nest in 2019.

Appendix A, Photograph A-2. Nest 1619 was located approximately 5.4 miles southeast of the Project boundary. During the 2019 survey, the nest was in good condition. Two adult bald eagles were observed perched on the nest (prior to the photograph being taken) and the nest appeared to have been recently tended; however, no eggs, chicks, or signs of incubating or brooding were observed. The nest was therefore classified as an occupied and inactive bald eagle nest in 2019. It is possible that the two bald eagles observed at this nest were actively nesting at Nest 2207 nearby.

Appendix A, Photograph A-3. Nest 1618 was located approximately 6.3 miles east of the Project boundary in Lincoln County, Minnesota. During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019.

Appendix A, Photograph A-4. Nest 1620 was located approximately 6.9 miles northeast of the Project boundary. During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019.

Appendix A, Photograph A-5. Nest 14384 was located approximately 7.7 miles west of the Project boundary. This nest was in good condition. Two adult bald eagles were observed; one was perched nearby and the other was incubating on the nest at the time of the survey in April. The nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019.

Appendix A, Photograph A-6. Nest 2195 was located approximately 9.4 miles north of the Project boundary. During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore considered an occupied and active bald eagle nest in 2019.

Appendix A, Photograph A-7. Nest 14383 was located approximately 9.8 miles west of the Project boundary. During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest at the time of the survey in April, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied and active bald eagle nest in 2019.

Appendix A, Photograph A-8. Nest 1744 was located approximately 11.4 miles east of the Project boundary in Lincoln County, Minnesota. During the 2019 survey, the nest was in good condition. An adult bald eagle was observed incubating on the nest, and the nest appeared to have been recently tended at the time of the survey in April. The nest was therefore classified as an occupied and active bald eagle nest in 2019.

Appendix A, Photograph A-9. Nest 1621 was located approximately 7.8 miles northeast of the Project boundary. During the 2019 survey, the nest was in good condition. No eagles were observed on the nest, but it was consistent in size and shape with a bald eagle nest. An adult great horned owl was observed incubating on the nest, and the nest appeared to have been recently tended. The nest was therefore classified as an occupied active great horned owl nest in 2019.

Appendix H

Northern Long-eared Bat Habitat Assessment

Northern Long-Eared Bat
Desktop Habitat Assessment

Tatanka Ridge Wind Project
Deuel County, South Dakota

Prepared for:

Tatanka Ridge Wind, LLC

1125 NW Couch Street, Suite 600
Portland, Oregon 97209

Prepared by:

Brenna Hyzy and Janelle Rieland

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, Minnesota 55427

May 1, 2019

WEST Inc.

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Joyce Pickle	Senior Manager
Janelle Rieland	Project Manager
Brenna Hyzy	Bat Biologist
Ryan Anderson	GIS Specialist

REPORT REFERENCE

Hyzy, B. and J. Rieland. 2019. Northern Long-Eared Bat Desktop Habitat Assessment, Tatanka Ridge Wind Project, Deuel County, South Dakota. Prepared for Tatanka Ridge, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. May 1, 2019.

TABLE OF CONTENTS

INTRODUCTION 1
NORTHERN LONG-EARED BAT SUMMER HABITAT REQUIREMENTS 1
HABITAT ASSESSMENT METHODS 2
RESULTS 3
DISCUSSION 3
REFERENCES 6

LIST OF FIGURES

Figure 1. Potential northern long-eared bat summer habitat within the Project and within 2.5 miles of the Tatanka Ridge Wind Project, Deuel County, South Dakota. 5

INTRODUCTION

Tatanka Ridge Wind, LLC (Tatanka Ridge), a subsidiary of Avangrid Renewables, LLC, has proposed development of the Tatanka Ridge Wind Project (Project) located in Deuel County, South Dakota. The Project is approximately six miles (mi) west of the South Dakota/Minnesota border, and directly north of the town of Toronto, South Dakota (Figure 1). The proposed Project will have a nameplate capacity of up to 155 megawatts, consisting of up to 62 wind turbines and associated infrastructure such as access roads, electrical collection system, substation, operations and maintenance building, and a permanent meteorological tower.

The northern long-eared bat (NLEB; *Myotis septentrionalis*) is listed as a threatened species throughout its range under the federal Endangered Species Act. To better understand potential use of the Project by the NLEB, Western EcoSystems Technology, Inc. (WEST) conducted a desktop habitat assessment in 2018 (WEST 2018b). The Project expanded; therefore, Tatanka Ridge requested that WEST conduct a desktop habitat assessment using the revised and expanded Project boundary.

The desktop assessment was completed in accordance with the Phase 1 survey recommendations found in the US Fish and Wildlife Service (USFWS) *Northern Long-eared Bat Interim Conference and Planning Guidance* (USFWS 2014) and *2019 Range-Wide Indiana Bat Summer Survey Guidelines* (2019 Survey Guidelines; USFWS 2019). USFWS guidance calls for NLEB surveys to adhere to Indiana bat (*Myotis sodalis*) survey guidelines. Because the Project location is well north of the known range of the Indiana bat, this assessment focused on the NLEB.

NORTHERN LONG-EARED BAT SUMMER HABITAT REQUIREMENTS

The NLEB is a forest-dependent species, generally relying on forest features for both foraging and roosting during the summer months (USFWS 2013). In particular, the NLEB appears to be a forest interior species that requires adequate canopy closure for both roosting and foraging habitat (Lausen 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 and Broders 2008).

NLEBs roost singly, or in colonies, underneath bark, in cavities, or in crevices of both live and dead trees (USFWS 2014). 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 et al. 1999).

A study of nine female NLEBs, using an intensively managed forest in West Virginia, found this species forages in areas with forest patch sizes between 114 and 161 acres (Owen et al. 2003). Abundance of NLEB prey items, particularly beetles and moths, are typically higher in more closed forest stands than in forest openings, which supports studies that have found NLEBs tend to avoid open habitats (Owen et al. 2003). Based on current knowledge, it is unlikely that the NLEB would cross over large open lands (e.g., land lacking suitable habitat) to search for foraging and roosting habitats.

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 acres of actual forest cover as traveling and commuting habitat (Henderson and Broders 2008, Foster and Kurta 1999). During recent coordination between WEST biologists and the USFWS Michigan Ecological Services Field Office, USFWS staff suggested that they will be using 10 acres as the minimum forested patch size for suitable summer habitat moving forward (WEST 2018a). To facilitate a consistent approach for NLEB habitat review across the species range, this habitat assessment uses 10 acres as the minimum forested patch size considered suitable summer habitat for the NLEB.

HABITAT ASSESSMENT METHODS

The NLEB interim guidance document (USFWS 2014) provides a home range estimate of 1.5 mi for NLEB and 2.5 mi for Indiana bats. This desktop habitat assessment utilizes a 2.5-mi buffer around the Project boundary, referred to as the Assessment Area, in order to provide a conservative estimate of the potential foraging range of NLEB and to identify potential corridors of connected habitat in the vicinity of the Project.

WEST derived potential NLEB summer habitat in the Assessment Area using a machine learning classification algorithm to delineate forest patches. The classifier was built using imagery from the Landsat 8 and Sentinel-2 satellites (US Geological Survey [USGS] 2016, European Space Agency 2017), as well as aerial imagery from the National Agriculture Imagery Program (USGS 2018) and used in a Random Forests model (Breiman 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.

WEST biologists determined the potential suitability of forested habitat within the Assessment Area for NLEB based on the USFWS's *Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects* (2011), the 2019 Survey Guidelines (USFWS 2019), and the recent USFWS recommendation to use 10 acres as the minimum forested patch size for suitable summer habitat (WEST 2018a). For the purposes of this assessment, WEST categorized potentially suitable forest patches for NLEB within the Assessment Area into the following categories:

- Greater than 10 acres – Suitable roost/foraging/commuting areas (larger areas of contiguous forests and/or riparian corridors).

- Less than 10 acres – Unsuitable roost-foraging/commuting (typically include small isolated shelterbelts and individual trees).

Although NLEB are a forest-dependent species, the species will use open areas that are proximate to occupied habitat. Studies of Indiana and NLEB behavior using telemetry data on foraging activity have indicated that isolated trees or small forest patches might only be suitable as habitat when they are less than 1,000 feet from other forested/wooded habitats (USFWS 2014, USFWS 2011). Therefore, a 1,000-foot connected habitat buffer was placed around suitable forested patches to conservatively identify non-forested areas within the Assessment Area that could be utilized by NLEB moving between roosting and foraging areas.

RESULTS

Within the Assessment Area, wooded habitat is almost exclusively confined to small woodlots and windbreak treerows, with the majority of wooded areas consisting of small, scattered patches. The desktop habitat assessment identified approximately 195 acres of potentially suitable NLEB habitat within the Project boundary; 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 (at least 10 acres; Figure 1). The three largest forested patches are described below.

- Area A – The largest patch of suitable forested habitat is a 15.1-acre forested patch in the southeastern portion of the Project (depicted in orange on Figure 1). Several smaller forested patches are present within the connected habitat buffer (depicted in green on Figure 1), resulting in a total of approximately 21 acres of forested habitat within Area A.

- Area B – Area B is along the northern boundary of the Project and contains two distinct forest patches large enough to support NLEB. In total, Area B contains 27 acres of forested habitat, comprised of a 14.2-acre forested patch and a 12.8-acre forested patch (depicted in orange on Figure 1).

- Area C – Area C is along the southern boundary of the Project and contains two distinct forest patches large enough to support NLEB. In total, Area C contains 31.7 acres of forested habitat, including two 13.9-acre forested patches (depicted in orange on Figure 1), and several smaller forested patches (depicted in green on Figure 1).

DISCUSSION

The 2019 USFWS Guidelines describe the minimum survey effort for acoustic surveys associated with non-linear projects to be one survey site per 123 acres of suitable summer habitat. Because approximately 195 acres of suitable summer habitat is present with the Project, WEST recommends that surveys be conducted at two sites, as described below and depicted on Figure 1.

- 2018 Acoustic Survey Location - Acoustic presence/probable absence surveys were conducted at one location within the Project (depicted on Figure 1) during the 2018 field season in accordance with the *2018 Range-Wide Indiana Bat Summer Survey Guidelines*

(USFWS 2018), which had negative results indicating probable absence of NLEB (Hyzy and Rieland 2018). Survey results are valid for 5 years (USFWS 2018); therefore, additional surveys will not be required at this survey site in 2019.

- 2019 Acoustic Survey Location - Acoustic presence/probable absence surveys will be conducted at one of the two potential survey locations identified on Figure 1; surveys will be conducted in accordance with the 2019 Survey Guidelines (USFWS 2019).

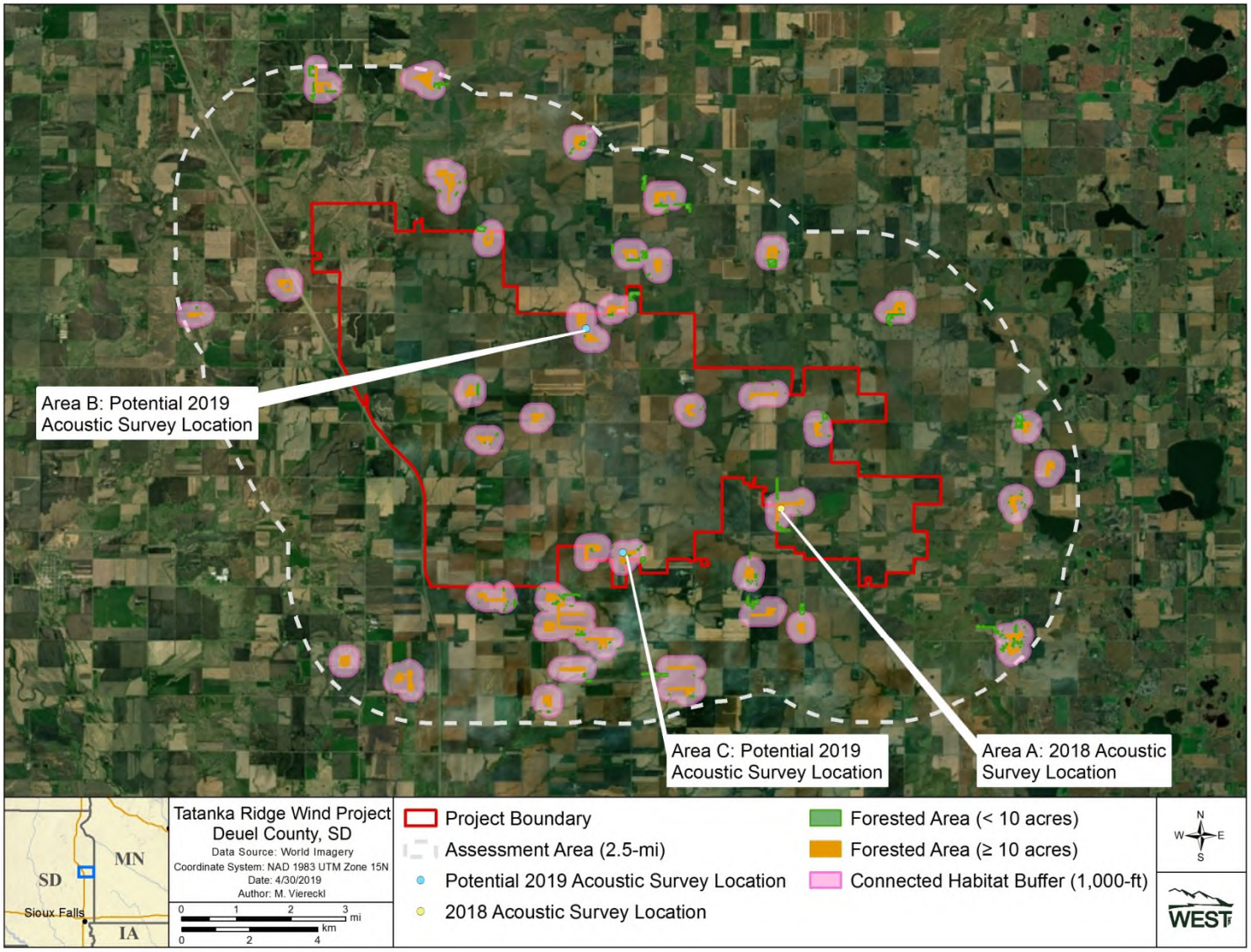


Figure 1. Potential northern long-eared bat summer habitat within the Project and within 2.5 miles of the Tatanka Ridge Wind Project, Deuel County, South Dakota.

REFERENCES

Breiman, L. 2001. Random Forests. Machine Learning 45(5):5-32. Available online: https://link.springer.com/article/10.1023%2FA%3A1010933404324

ESRI. 2018. World Imagery and Aerial Photos. ArcGIS Resource Center. ESRI, producers of ArcGIS software. Redlands, California. Information online: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

European Space Agency. 2017. Copernicus Sentinel data 2017 for Sentinel data.

Foster, R. W. and A. Kurta. 1999. Roosting Ecology of the Northern Bat (*Myotis septentrionalis*) and Comparisons with the Endangered Indiana Bat (*Myotis sodalis*). Journal of Mammalogy 80(2): 659-672.

Grindal, S. D., J. L. Morissette, and R. M. Brigham. 1999. Concentration of Bat Activity in Riparian Habitats over an Elevational Gradient. Canadian Journal of Zoology 77(6): 972-977. doi: 10.1139/z99-062.

Henderson, L. E. and H. G. Broders. 2008. Movements and Resource Selection of the Northern Long-Eared Myotis (*Myotis septentrionalis*) in a Forest-Agriculture Landscape. Journal of Mammalogy 89: 952-963.

Hyzy, B. and J. Rieland. 2018. Northern Long-Eared Bat Presence/Probable Absence Acoustic Survey Report, Tatanka Ridge Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. November 8, 2018.

Lausen, C. 2009. Status of the Northern Myotis (*Myotis septentrionalis*) in Alberta. Alberta Wildlife Status Report No. 3: (Update 2009).

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Owen, S. F., M. A. Menzel, W. M. Ford, B. R. Chapman, K. V. Miller, J. W. Edwards, and P. B. Wood. 2003. Home-Range Size and Habitat Used by the Northern Myotis (*Myotis septentrionalis*). American Midland Naturalist 150(2): 352-359.

US Fish and Wildlife Service (USFWS). 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (Revised: 26 October 2011). Available online at: http://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbaS7and10WindGuidanceFinal26Oct2011.pdf

US Fish and Wildlife Service (USFWS). 2013. Northern Long-Eared Bat (*Myotis septentrionalis*). USFWS Fact Sheet. September 2013.

US Fish and Wildlife Service (USFWS). 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5, and 6. January 6, 2014. Available online: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

US Fish and Wildlife Service (USFWS). 2018. 2018 Range-Wide Indiana Bat Summer Survey Guidelines (May 2018). USFWS Endangered Species Program: Midwest Region. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf

US Fish and Wildlife Service (USFWS). 2019. 2019 Range-Wide Indiana Bat Summer Survey Guidelines (April 2019). USFWS Endangered Species Program: Midwest Region. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2019_Rangewide_IBat_Survey_Guidelines.pdf

US Geological Survey. 2018. USGS Public Distribution of FWA 10:1 NAIP Imagery Downloadable Data Collection from The National Map. Available online: https://catalog.data.gov/dataset/fsa-10-1-naip-imagery-downloadable-data-collection-from-the-national-map

US Geological Survey. 2016. Landsat collections. Available online: https://landsat.usgs.gov/landsat-collections

Western Ecosystems Technology, Inc. (WEST). 2018a. Minutes from meeting between J. Dingledine, S.Hicks, C. Mensing, and J. Wong (US Fish and Wildlife Service) and C. Fritchman, R. Good, and K. Murray (WEST). December 6, 2018.

Western EcoSystems Technology, Inc. (WEST). 2018b. Northern Long-Eared Bat Desktop Habitat Assessment, Tatanka Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. May 30, 2018.

Appendix I

Northern Long-eared Bat Survey Report

Northern Long-Eared Bat
Presence/Probable Absence Acoustic Survey Report
Tatanka Ridge Wind Project
Deuel County, South Dakota

July 12 – 15, 2018

Prepared for:

Buffalo Ridge III, LLC

1125 NW Couch Street, Suite 600
Portland, Oregon 97209

Prepared by:

Brenna Hyzy and Janelle Rieland

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

November 8, 2018

WEST Inc.

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Karl Kosciuch, PhD	Report Reviewer
Janelle Rieland	Project Manager
Kevin Murray, PhD	Acoustic Analyst, Senior Bat Biologist
Ashley Matteson	Acoustic Analyst
Brenna Hyzy	Report Writer, Bat Biologist
Steven Neumann	Acoustic Technician
Casi Lathan	Technical Editor

REPORT REFERENCE

Hyzy, B. and J. Rieland. 2018. Northern Long-Eared Bat Presence/Probable Absence Acoustic Survey Report, Tatanka Ridge Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. November 8, 2018.

TABLE OF CONTENTS

INTRODUCTION 1
BACKGROUND 1
Habitat Requirements 1
Desktop Habitat Assessment 3
METHODS 5
RESULTS 7
CONCLUSIONS 9
LITERATURE CITED 10

LIST OF FIGURES

Figure 1. Location of the Tatanka Ridge Wind Project in Deuel County, South Dakota. 2
Figure 2. Suitable northern long-eared bat summer habitat and acoustic survey site within the Tatanka Ridge Wind Project in Deuel County, South Dakota. 4
Figure 3. Acoustic detector locations within the Tatanka Ridge Wind Project in Deuel County, South Dakota 6

LIST OF TABLES

Table 1. Site description of acoustic detector locations at the Tatanka Ridge Wind Project in Deuel County, South Dakota. 8
Table 2. Number of bat calls recorded at each acoustic detector location, as determined by Kaleidoscope, for the Tatanka Ridge Wind Project in Deuel County, South Dakota 8
Table 3. Summary of Kaleidoscope echolocation call identifications for the Tatanka Ridge Wind Project in Deuel County, South Dakota 8
Table 4. Summary of actions at each acoustic detector location for the Tatanka Ridge Wind Project in Deuel County, South Dakota 9

LIST OF APPENDICES

Appendix A. Tatanka Ridge Wind Project Acoustic Detector Location Photographs and Datasheets

NOTES ON UNITS

Imperial units are used throughout this document, with the exception of the use of meters when describing survey methodology, where metric is used to be consistent with agency guidelines. Conversions are provided below.

Unit Conversions

Imperial	Metric
1 foot	0.3048 meter
3.28 feet	1 meter
1 mile	1.61 kilometer
0.621 mile	1 kilometer
1 acre	0.40 hectare
2.47 acres	1 hectare

Common Conversions

Imperial	Metric
0.12 mile	200 meters
0.5 mile	800 meters
10 miles	16.1 kilometers

INTRODUCTION

Buffalo Ridge III, LLC (Buffalo Ridge III), a subsidiary of Avangrid Renewables, LLC, has proposed development of the Tatanka Ridge Wind Project (Project) located approximately five miles (mi) west of the South Dakota-Minnesota border, and directly north of the town of Toronto in Deuel County, South Dakota (Figure 1). Buffalo Ridge III contracted Western EcoSystems Technology, Inc. (WEST) to conduct acoustic surveys to determine the presence/probable absence[1] of the federally threatened northern long-eared bat (NLEB; *Myotis septentrionalis*) in the Project area during the summer months. Surveys were conducted in accordance with procedures specified in the US Fish and Wildlife Service (USFWS) *Northern Long-Eared Bat Interim Conference and Planning Guidance* (USFWS 2014) and the *2018 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS Guidelines; USFWS 2018). This report summarizes the results of the NLEB acoustic presence/probable absence surveys completed for the Project during summer 2018.

BACKGROUND

Habitat Requirements

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

Although 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 found NLEB may use woodlots and riparian zones with as few as 15 to 49 acres of forest cover (Henderson and Broders 2008, Foster and Kurta 1999). Individual trees may also be considered suitable summer habitat when they exhibit the characteristics of a potential roost tree (defined by the USFWS as a tree with a 5-inch diameter at breast height) and are located within 1,000 feet (ft) of other forested/wooded habitat (USFWS 2018).

[1] Although surveys can prove that a species is present within an area, surveys cannot definitively prove absence of a species. Consistent with the USFWS Guidelines, as used in this report, the term probable absence indicates that surveys were conducted in accordance with agency requirements (USFWS 2018), and that the survey results were negative; therefore, surveys determined the probable absence of the NLEB.

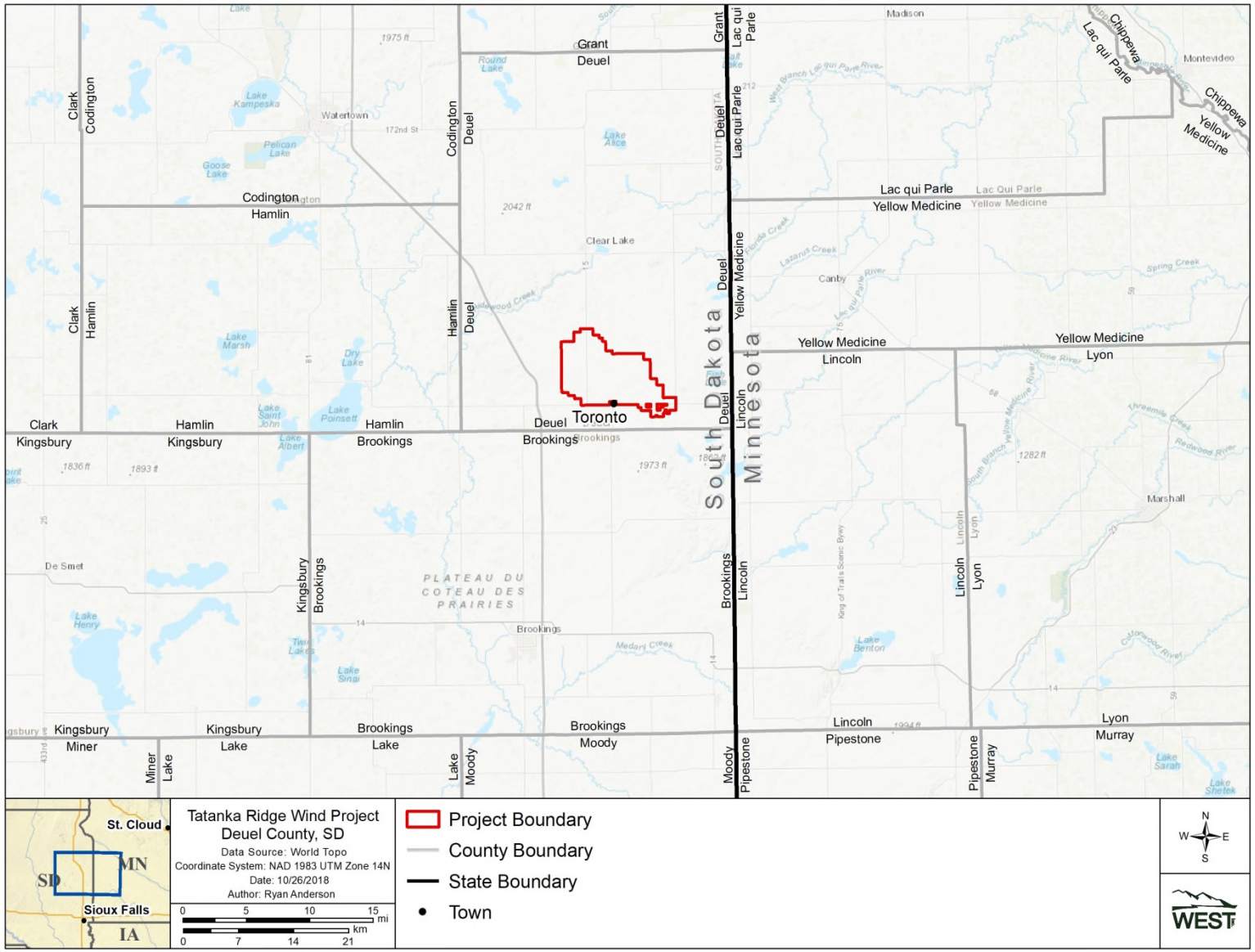


Figure 1. Location of the Tatanka Ridge Wind Project in Deuel County, South Dakota.

Desktop Habitat Assessment

In accordance with the USFWS Guidelines (Phase 1 – Initial Project Screening), which are also applicable to NLEB, a desktop habitat assessment was completed by WEST for the Project in May 2018. The assessment, which is summarized below, identified a total of approximately 60 acres of suitable summer habitat for the NLEB within the Project (WEST 2018).

The assessment derived potential NLEB summer habitat using a machine learning classification algorithm to delineate forest patches. The classifier was built using imagery from the Landsat 8 and Sentinel-2 satellites (US Geological Survey [USGS] 2016, European Space Agency 2017), as well as aerial imagery from the National Agriculture Imagery Program (USGS 2018) and used in a Random Forests model (Breiman 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.

WEST biologists determined the potential suitability of forested patches for NLEB based on the USFWS's *Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects* (2011) and the USFWS Guidelines (USFWS 2018). According to the USFWS, both of these documents and the protocols therein can be used for NLEB presence/probable absence summer surveys (USFWS 2018). WEST categorized potentially suitable summer habitat for NLEB into the following:

- Greater than 50 acres – Medium-large roost/foraging areas (larger areas of contiguous forests and/or riparian corridors).
- Between 15 and 50 acres – Small roost/foraging areas (smaller areas of forest comprised of woodlots and riparian corridors).
- Less than 15 acres – Commuting/travel corridors (typically include shelterbelts and small woodlots).
- Connected habitat buffer – A 1,000-ft connected habitat buffer was placed around forested patches to conservatively identify non-forested areas NLEB may utilize for movement. .

WEST's desktop habitat assessment identified potentially suitable summer habitat for NLEB within two areas, which are depicted in Figure 2:

- Habitat Area #1 was primarily located southwest of the Project, although a portion of this habitat area extended into the southern portion of the Project. The portion of Habitat Area #1 within the Project boundary contained a total of approximately 23 acres of forested patches that could be used by NLEB for commuting/travel corridors.
- Habitat Area #2 was located in the south-central portion of the Project, and contained a total of approximately 37 acres of forested patches that could be used by NLEB. This included one small roost/foraging area comprised of several connected windbreaks and small woodlots that could function as commuting/travel corridors.

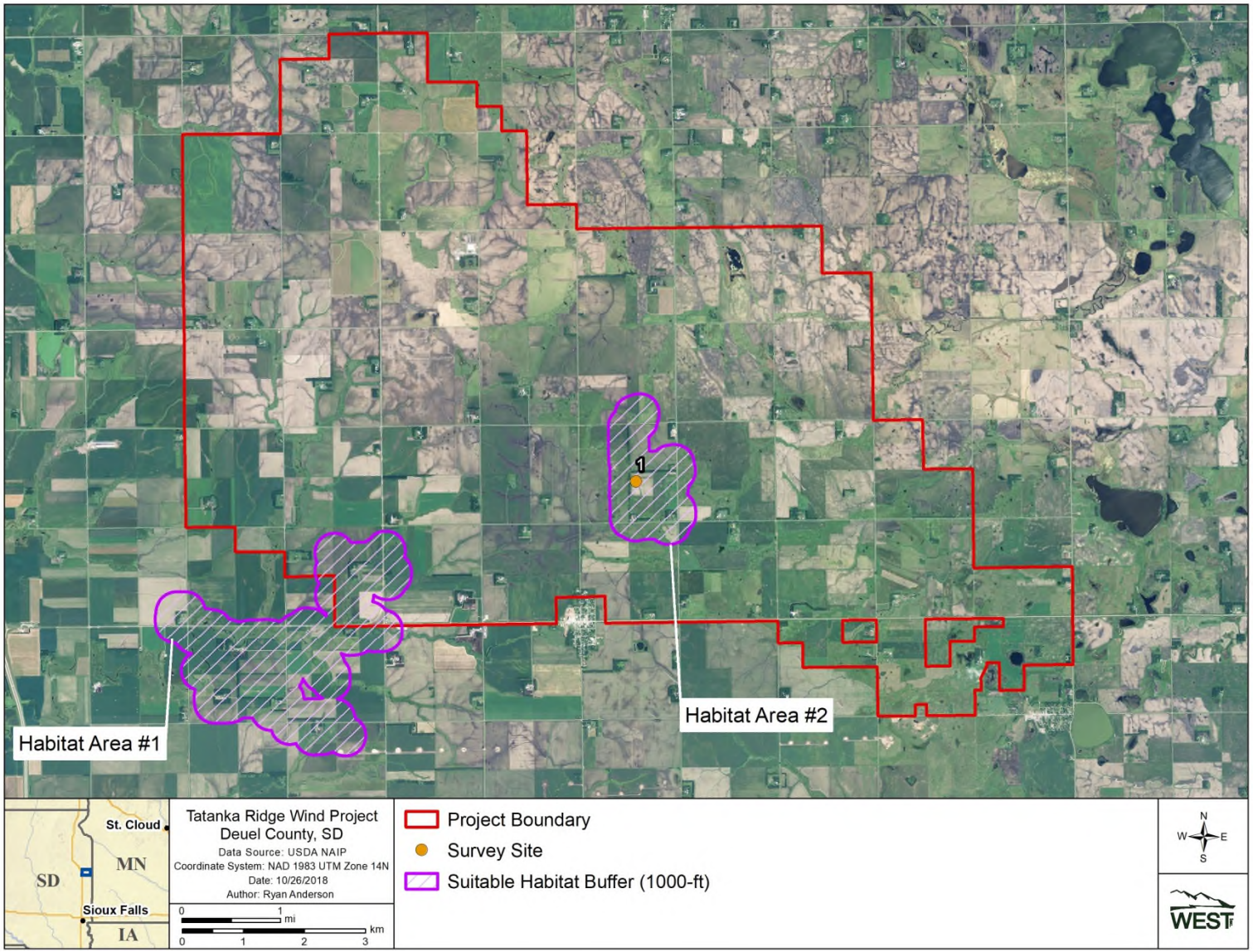


Figure 2. Suitable northern long-eared bat summer habitat and acoustic survey site within the Tatanka Ridge Wind Project in Deuel County, South Dakota.

METHODS

The USFWS Guidelines (USFWS 2018) describe the minimum survey effort for acoustic surveys associated with non-linear projects to be a minimum of eight detector nights per 123 acres of suitable summer habitat. The Project contains 60 acres of suitable habitat; therefore, one acoustic survey site was selected within the Project. The survey site was a small roost/foraging area within Habitat Area #2 (described above; Figure 2). Four detector locations were established within the survey site (Figure 3), each of which was surveyed for at least two calendar nights between July 12–15, 2018, resulting in a total of eight valid detector nights.

The survey site was located in a 15.1-acre roost/foraging area in the vicinity of water sources. Because the forested area was primarily comprised of wind breaks, each of the four detectors was placed along a field edge where canopy heights were greater than 33 ft (10 meters [m]); detectors were spaced approximately 656 ft (200 m) apart when possible and elevated at least 9.8 ft (3.0 m) above the ground level to minimize acoustic interference from vegetation. Bats were surveyed using full spectrum Song Meter SM4 acoustic recorders (Wildlife Acoustics, Inc.).

Acoustic monitoring began before sunset and continued until after sunrise (6:00 pm through 8:00 am). Weather was monitored using an online weather system; if weather conditions such as persistent rain (more than 30 minutes), strong sustained winds (greater than nine miles per hour average for more than 30 minutes), or cold temperatures (below 10° Celsius [50° Fahrenheit] for more than 30 minutes) occurred during the first five hours of a survey night, then that location was surveyed for an additional night unless target species were detected or bat activity was unaffected by weather conditions (USFWS 2018). For each acoustic survey location, the date, start and end time, site description, site coordinates, and weather data were recorded. Representative photographs of each acoustic detector location were taken.

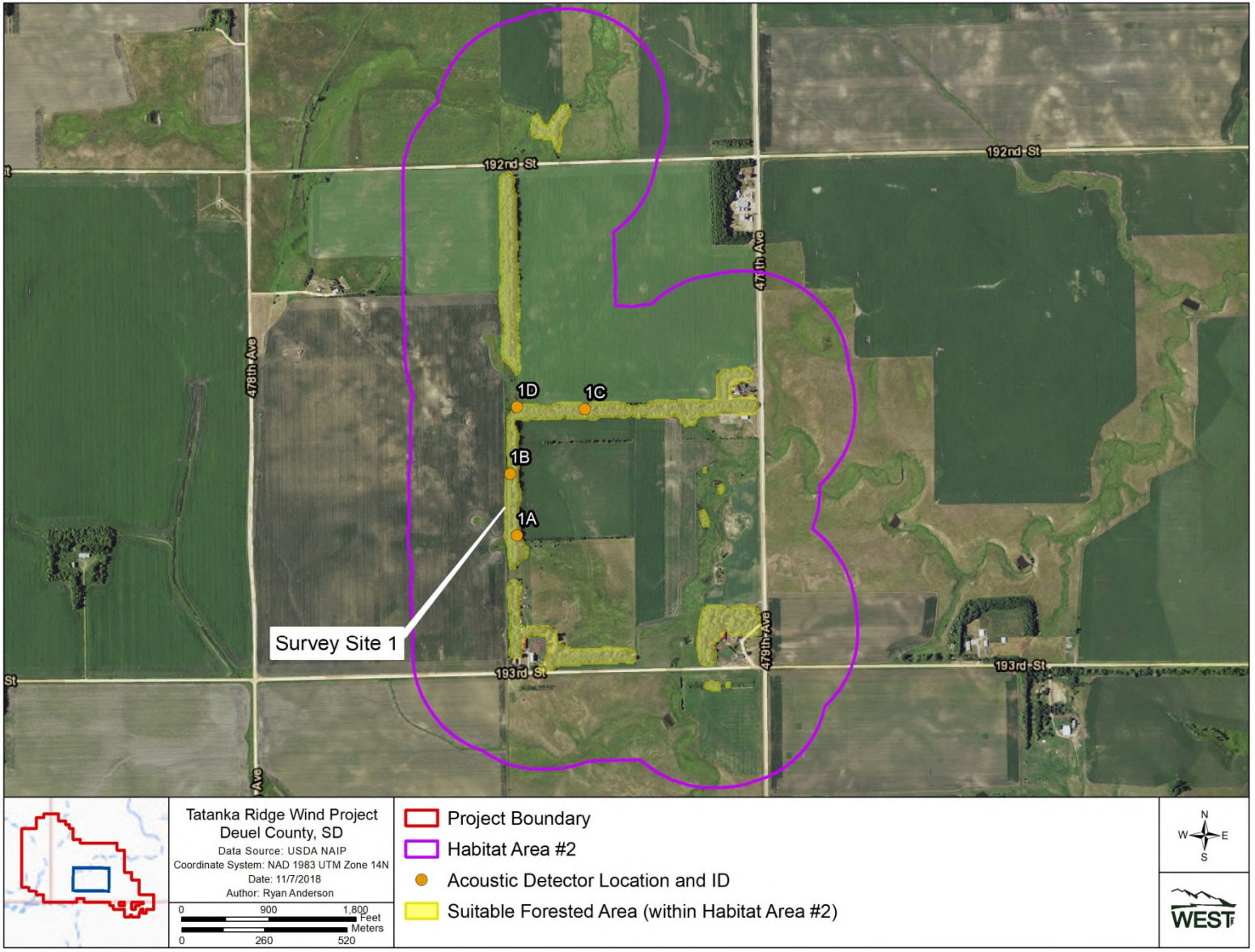


Figure 1. Acoustic detector locations within the Tatanka Ridge Wind Project in Deuel County, South Dakota.

WEST used a two-step approach to determine if NLEB calls were present in data collected at the Project.

- Bat calls were quantitatively identified using the USFWS-approved automated identification software program (Kaleidoscope Pro, version 4.2.0, Wildlife Acoustics, Inc.). Kaleidoscope generates a list of maximum likelihood estimator (MLE) p-values for each survey night for each bat species with the potential to occur within the Project. The MLE determines the most likely distribution of different species for the observed classifications given the estimated classifier error rate. To do this, Kaleidoscope provides the number of calls classified as each bat species. Presence/probable absence is determined using a likelihood ratio test to calculate the p-value corresponding to a null hypothesis of absence. To calculate p-values, the species of interest is clamped as absent and the likelihood of this result given the data is calculated. The numerator of the likelihood ratio is the clamped likelihood (i.e., likelihood of species absence given the data). The denominator is the original estimated likelihood (i.e., likelihood of species presence given the data). A high p-value (>0.05) fails to reject the null hypothesis and indicates probable absence. A low p-value (<0.05) rejects the null hypothesis of absence and indicates species presence.

- For each night where Kaleidoscope indicated that the presence of NLEB was likely (i.e., MLE p-value <0.05), a subsequent qualitative echolocation analysis of all calls from that night was conducted by a biologist experienced with acoustic identification and who met required USFWS qualifications (Ashley Matteson, M.S. and Dr. Kevin Murray of WEST). If the subsequent analysis indicated that each probable call was not characteristic of NLEB, contained distinct a call produced by species other than NLEB, or was of insufficient quality, the call was reclassified as another species, an unknown Myotis, or an unknown high frequency call.

Per USFWS Guidelines (USFWS 2018), NLEB were considered present at the survey site if at least one probable call identified by Kaleidoscope was verified by qualitative analysis. Probable absence of NLEB was determined at the survey site if Kaleidoscope did not identify any probable NLEB calls, or if subsequent qualitative analysis of probable NLEB calls (as identified by Kaleidoscope) were not verified by qualitative analysis.

RESULTS

Acoustic surveys were completed at one survey site (four detector locations) from July 12–15, 2018, for a total of eight valid detector nights that met weather and other criteria. Rain persisted for more than 30 minutes on the night of July 12; therefore, the night did not meet the required weather conditions and was considered invalid for all four detector locations. Valid detector nights for all units occurred the nights of July 13 and July 14. Universal Transverse Mercator coordinates and site descriptions for each detector location are listed in Table 1. Photographs and datasheets with location descriptions are included in Appendix A.

Table 1. Site description of acoustic detector locations at the Tatanka Ridge Wind Project in Deuel County, South Dakota.

Survey Site and Location ID	Easting†	Northing†	Site Description
1A	687953	4940265	Field edge
1B	687928	4940458	Field edge
1C	688159	4940666	Field edge
1D	687945	4940669	Field edge

† = North American Datum of 1983, Zone 14

To assess study conditions for compliance with USFWS Guidelines (USFWS 2018), weather was monitored using the Brandt weather station (KSDBRAND7) on Weather Underground's online weather system (http://www.wunderground.com). Weather conditions met the criteria for all four detector locations on the nights of July 13 and July 14. Together, these four detector locations collected eight nights of valid data, meeting the requirement of at least eight detector nights per site.

Kaleidoscope identified a total of 3,148 bat call files, of which 2,800 files (88.9%) were identified to species. The average number of bat calls per detector night was 393.5. Table 2 summarizes the number of detector nights, number of bat call files, and number of bat calls identified to species at each detector location. Table 3 provides information on species identifications for each of the four detector locations.

Table 2. Number of bat calls recorded at each acoustic detector location, as determined by Kaleidoscope, for the Tatanka Ridge Wind Project in Deuel County, South Dakota.

Survey Site and Location ID	ID Program	Total Bat Calls	Calls Identified to Species	Valid Detector Nights	Average # Calls/Detector Night
1A	Kaleidoscope	700	610	2	350.0
1B	Kaleidoscope	709	608	2	354.5
1C	Kaleidoscope	389	334	2	194.5
1D	Kaleidoscope	1,350	1,248	2	675.0
Total		**3,148**	**2,800**	**8**	**393.5**

Table 3. Summary of Kaleidoscope echolocation call identifications for the Tatanka Ridge Wind Project in Deuel County, South Dakota.

Survey Site and Location ID	EPFU	LABO	LACI	LANO	MYLU	MYSE	PESU	UNK	Total
1A	431	45	112	16	5	0	1	90	**700**
1B	437	74	70	19	6	0	2	101	**709**
1C	231	15	39	49	0	0	0	55	**389**
1D	1,067	80	78	19	3	0	1	102	**1,350**
Total	**2,166**	**214**	**299**	**103**	**14**	**0**	**4**	**348**	**3,148**

EPFU = big brown bat (*Eptesicus fuscus*); LABO = eastern red bat (*Lasiurus borealis*); LACI = hoary bat (*L. cinereus*); LANO = silver-haired bat (*Lasionycteris noctivagans*); MYLU = little brown bat (*Myotis lucifugus*); MYSE = northern long-eared bat (*M. septentrionalis*); PESU = tri-colored bat (*Perimyotis subflavus*); UNK = unknown.

Kaleidoscope identified no probable NLEB calls at any of the four detector locations surveyed. Qualitative analysis was not required due to the lack of probable NLEB calls detected by Kaleidoscope. Therefore, surveys have determined the probable absence of the NLEB from the Project area (Table 4).

Table 4. Summary of actions at each acoustic detector location for the Tatanka Ridge Wind Project in Deuel County, South Dakota.

Survey Site and Location ID	Kaleidoscope Identified NLEB Calls (yes/no)	Maximum Likelihood Estimator ($p < 0.05$) NLEB Calls (yes/no)	NLEB Qualitatively Verified	Recommended Action [1]
1A	No	No	No	No further action
1B	No	No	No	No further action
1C	No	No	No	No further action
1D	No	No	No	No further action

NLEB = Northern long-eared bat (*Myotis septentrionalis*)

1 Per Step 6 (Conduct Automated Acoustic Analyses) of the US Fish and Wildlife Service's *2018 Range-Wide Indiana Bat Summer Survey Guidelines*, because NLEB presence was considered unlikely by the approved program (Kaleidoscope), no further summer surveys are necessary.

CONCLUSIONS

No NLEB calls were detected by the automated acoustic identification software or qualitatively verified at any detector locations during surveys in 2018. Therefore, the conclusion of probable absence of NLEB from the proposed Project is supported by the survey results. Surveys are considered complete for all four detector locations at the single survey site, and no further action is recommended to confirm NLEB absence pursuant to USFWS *Northern Long-eared Bat Interim Conference and Planning Guidance* (USFWS 2014) and USFWS Guidelines (USFWS 2018). These survey results are valid for a minimum of five years[2] from the completion of the survey unless new information (e.g., other nearby surveys) suggest otherwise (USFWS 2018).

[2] The timeframe may be reduced if significant habitat changes have occurred in the area or increased based on local information.

LITERATURE CITED

Breiman, L. 2001. Random Forests. Machine Learning 45(5):5-32. Available online: https://link.springer.com/article/10.1023%2FA%3A1010933404324

Environmental Systems Research Institute (ESRI). 2018. World Street Map. ArcGIS Resource Center. Environmental Systems Research Institute (ESRI), producers of ArcGIS software, Redlands, California. Data accessed January 2018. Available online: https://www.arcgis.com/home/item.html?id=3b93337983e9436f8db950e 38a8629af

European Space Agency. 2017. Copernicus Sentinel data 2017 for Sentinel data.

Foster, R. W. and A. Kurta. 1999. Roosting Ecology of the Northern Bat (Myotis Septentrionalis) and Comparisons with the Endangered Indiana Bat (Myotis Sodalis). Journal of Mammalogy 80(2): 659-672.

Henderson, L. E. and H. G. Broders. 2008. Movements and Resource Selection of the Northern Long-Eared Myotis (*Myotis Septentrionalis*) in a Forest-Agriculture Landscape. Journal of Mammalogy 89: 952-963.

Lausen, C. 2009. Status of the Northern Myotis (*Myotis Septentrionalis*) in Alberta. Alberta Wildlife Status Report No. 3: (Update 2009).

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

US Department of Agriculture (USDA). 2018. Imagery Programs - National Agriculture Imagery Program (Naip). USDA, Farm Service Agency (FSA), Aerial Photography Field Office (APFO), Salt Lake City, Utah. Accessed January 2018. Available online: https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

US Fish and Wildlife Service (USFWS). 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (Revised: 26 October 2011). Available online: http://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbaS7and10WindGuidanceFinal26Oct2011.pdf

US Fish and Wildlife Service (USFWS). 2013. Northern Long-Eared Bat (*Myotis septentrionalis*). USFWS Fact Sheet. September 2013.

US Fish and Wildlife Service (USFWS). 2014. Northern Long-eared Bat Interim Conference and Planning Guidance. January 6, 2014. USFWS Regions 2, 3, 4, 5, & 6. Available online: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

US Fish and Wildlife Service (USFWS). 2018. 2018 Range-Wide Indiana Bat Summer Survey Guidelines (May 2018). USFWS Endangered Species Program: Midwest Region. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf

US Geological Survey. 2016. Landsat collections. Available online: https://landsat.usgs.gov/wlandsat-collections

US Geological Survey. 2018. USGS Public Distribution of FWA 10:1 NAIP Imagery Downloadable Data Collection from The National Map. Available online: https://catalog.data.gov/dataset/fsa-10-1-naip-imagery-downloadable-data-collection-from-the-national-map

Western EcoSystems Technology, Inc. (WEST). 2018. Northern Long-Eared Bat Desktop Habitat Assessment, Tatanka Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. May 30, 2018.

Appendix A. Tatanka Ridge Wind Project Acoustic Detector Location Photographs and Datasheets

Acoustic Detector Location 1A

Location 1A - Detection Cone

Location 1A – Detector Location

Location 1A – Orientation

Location 1A Datasheet

Site Information			
Site ID: A	Project: Tatanka		State: South Dakota
	Surveyors: S. Neumann		County: Deuel
Start Date: 2018-07-12	End Date:	Datum: NAD83	UTM Zone: 14
Start Time: 1105	End Time:	Easting: 687953	Northing: 4940265

*Use 24 hour time format | *Use yyyy-mm-dd date format | *Easting should be 6 digits | *Northing should be 7 digits

Detector Information	Microphone Information		Anabat Only
Detector Model: SM4	Sound Reception: None		Audio Div (Should be 16)
Detector Serial: S4U02894			
Detector Housing: None	Mic Serial: MU101228	Mic Height (m): 3	Data Div (Should be 16)
	Mic Horizontal Orientation (0-360°): 350		
Battery Source: Internal	Mic Vertical Orientation (°): 0		

All Detector Checklist

Date (yyyy-mm-dd)	Time (24 Hour)	Battery Voltage (V)	Perform Mic Check	Inspect Cables; Mic Holder; Housing	Replace Data Card(s)	Change Battery	Comments (Detector set up, picked up, moved, knocked over, vandalized, etc.)	Anabat Only: Sensitivity Setting (Normally 6)	Test Indicators ("Data" lit and static heard)	Set Volume (Lowest Setting)	LED Indicator Lights (Should be Standby, unless between 10:00 and 8:00)
2018-07-12	1105	6.3	✓	✓	✓	✓	Detector set up				Record Status Data Standby Error
2018-07-15	1200	5.6	✓	✓			Detector pick up 5Gb				Record Status Data Standby Error
											Record Status Data Standby Error
											Record Status Data Standby Error

Habitat Composition within 100m (i.e. the sketched area)

[1] Primary Habitat: Field Edge	% Forest: 20
Forest Type: Deciduous	% Open/Ag: 80
Dominant Tree Species: Populus deltoides	% Water: 0
Stand Age (DBH): Late-successional (25 - 38 cm)	
Preferred Roost Tree Species Present:	
Topography: Flat	

[3]Habitat Description within 100m (i.e. the sketched area)

Detector between tree line and cornfield edge.

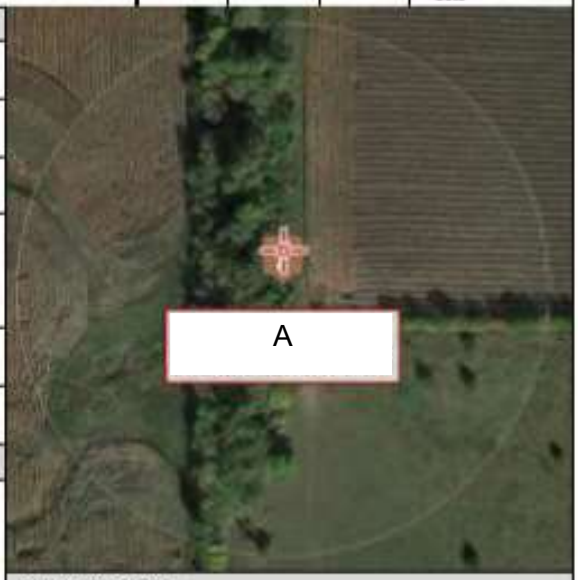


Photo Checklist

Detector Location: ✓ (Detector + All Surrounding Habitat)	Detector Orientation: ✓ (Detector + Bat Feature Sampled)	Detection Cone: ✓ (All Space Sampled)

[1] Choices: Bridge, Bottomland Forest, Cave Entrance, Creek/Riparian, Field Edge, Mine Portal, Open Field, Pond, Structure, Upland Forest, or Other (Give Brief Description)
[2] Map out habitat features within a 100 m radius of the detector (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.).
[3] Provide a written description of the surrounding habitat within a 100m radius of the detector, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).

Acoustic Detector Location 1B

Location 1B – Detection Cone

Location 1B – Location

Location 1B – Orientation

Location 1B Datasheet

Site Information			
Site ID: B	Project: Tatanka		State: South Dakota
	Surveyors: S. Neumann		County: Deuel
Start Date: 2018-07-12	End Date:	Datum: NAD83	UTM Zone: 14
Start Time: 1140	End Time:	Easting: 687928	Northing: 4940458
*Use 24 hour time format	*Use yyyy-mm-dd date format	*Easting should be 6 digits	*Northing should be 7 digits

Detector Information	Microphone Information		Anabat Only
Detector Model: SM4	Sound Reception: None		Audio Div (Should be 16)
Detector Serial: S4U02785			
Detector Housing: None	Mic Serial: MU106730	Mic Height (m): 3	Data Div (Should be 16)
	Mic Horizontal Orientation (0-360°): 0		
Battery Source: Internal	Mic Vertical Orientation (°): 0		

All Detector Checklist

Date (yyyy-mm-dd)	Time (24 Hour)	Battery Voltage (V)	Perform Mic Check	Inspect Cables; Mic Holder; Housing	Replace Data Card(s)	Change Battery	Comments (Detector set up, picked up, moved, knocked over, vandalized, etc.)	Anabat Only: Sensitivity Setting (Normally 6)	Test Indicators ("Data" lit and "Status" flash)	Set Volume (Lowest Setting)	LED Indicator Lights (Should be Standby, unless between 10:00 and 8:00)
2018-07-12	1140	6.3	✓	✓	✓	✓	Detector set up				Record Status Data Standby Error
											Record Status Data Standby Error
											Record Status Data Standby Error
											Record Status Data Standby Error

Habitat Composition within 100m (i.e. the sketched area)

[1] Primary Habitat: Field Edge	% Forest: 20
Forest Type: Deciduous	% Open/Ag: 80
Dominant Tree Species: Fraxinus pennsylvanica, Populus deltoides	% Water: 0
Stand Age (DBH): Mature (38 cm or greater)	
Preferred Roost Tree Species Present:	
Topography: Flat	

[3]Habitat Description within 100m (i.e. the sketched area)

Tree corridor between ag fields.

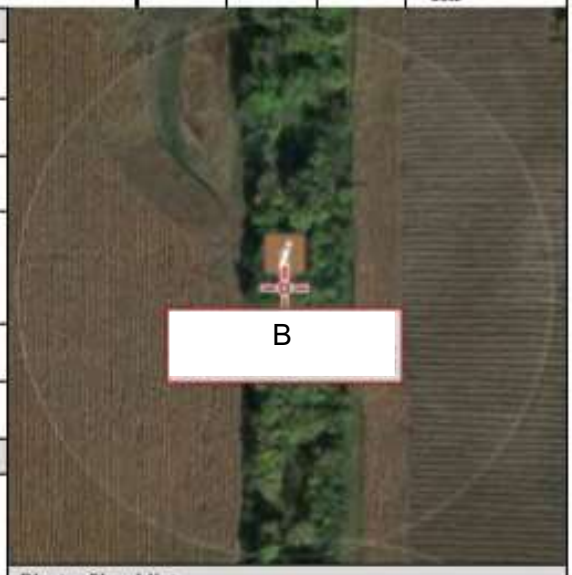


Photo Checklist

Detector Location: ✓ (Detector + All Surrounding Habitat)	Detector Orientation: ✓ (Detector + Bat Feature Sampled)	Detection Cone: ✓ (Air Space Sampled)

[1] Choices: Bridge, Bottomland Forest, Cave Entrance, Creek/Riparian, Field Edge, Mine Portal, Open Field, Pond, Structure, Upland Forest, or Other (Give Brief Description)
[2] Map out habitat features within a 100 m radius of the detector (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.).
[3] Provide a written description of the surrounding habitat within a 100m radius of the detector, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).

Acoustic Detector Location 1C

Location 1C – Detection Cone

Location 1C – Location

Location 1C – Orientation

Location 1C Datasheet

Site Information			
Site ID: C	Project: Tatanka		State: South Dakota
	Surveyors: S. Neumann		County: Deuel
Start Date: 2018-07-12	End Date:	Datum: NAD83	UTM Zone: 14
Start Time: 1245	End Time:	Easting: 688159	Northing: 4940666
*Use 24 hour time format	*Use yyyy-mm-dd date format	*Easting should be 6 digits	*Northing should be 7 digits

Detector Information	Microphone Information		Anabat Only
Detector Model: SM4	Sound Reception:		Audio Div (Should be 16)
Detector Serial: S4U00588			
Detector Housing: None	Mic Serial: MU106392	Mic Height (m): 3	Data Div (Should be 16)
	Mic Horizontal Orientation (0-360°): 90		
Battery Source: Internal	Mic Vertical Orientation (°): 0		

All Detector Checklist

Date (yyyy-mm-dd)	Time (24 Hour)	Battery Voltage (V)	Perform Mic Check	Inspect Cables, Mic Holder, Housing	Replace Data Card(s)	Change Battery	Comments (Detector set up, picked up, moved, knocked over, vandalized, etc.)	Anabat Only: Sensitivity Setting (Normally 6)	Test Indicators ("Data" lit and stable heard)	Set Volume (Lowest Setting)	Anabat Only: LED Indicator Lights (Should be Standby, unless between 10:00 and 8:00)
2018-07-12	1240	6.4	✓	✓	✓	✓	Detector set up				Record Standby Status Error Data
											Record Standby Status Error Data
											Record Standby Status Error Data
											Record Standby Status Error Data

Habitat Composition within 100m (i.e. the sketched area)

[1] Primary Habitat: Field Edge	% Forest: 20
Forest Type: Deciduous	% Open/Ag: 80
Dominant Tree Species: Populus deltoides, Fraxinus pennsylvanica	% Water: 0
Stand Age (DBH): Late-successional (25 - 38 cm)	
Preferred Roost Tree Species Present: Populus deltoides (snag)	
Topography: Flat	

[3]Habitat Description within 100m (i.e. the sketched area)

Tree corridor between ag fields.

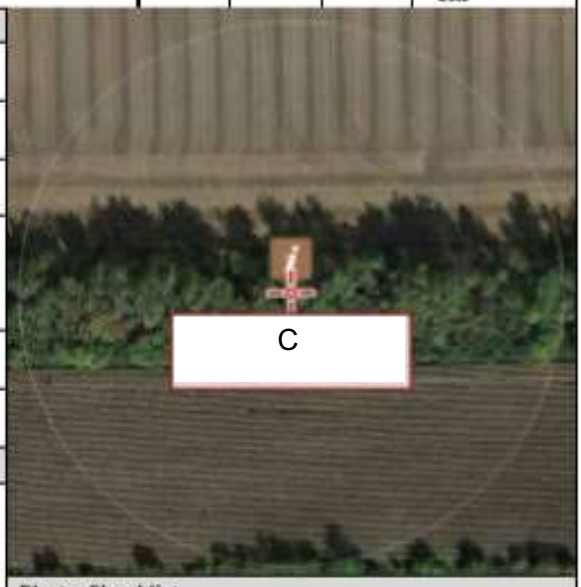


Photo Checklist

Detector Location: ✓ (Detector + All Surrounding Habitat)	Detector Orientation: ✓ (Detector + Bat Feature Sampled)	Detection Cone: ✓ (All Space Sampled)

[1] Choices: Bridge, Bottomland Forest, Cave Entrance, Creek/Riparian, Field Edge, Mine Portal, Open Field, Pond, Structure, Upland Forest, or Other (Give Brief Description)
[2] Map out habitat features within a 100 m radius of the detector (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.).
[3] Provide a written description of the surrounding habitat within a 100m radius of the detector, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).

Acoustic Detector Location 1D

Location 1D – Detection Cone

Location 1D – Location

Location 1D – Orientation

Location 1D Datasheet

Site Information			
Site ID: D	Project: Tatanka		State: South Dakota
	Surveyors: S. Neumann		County: Deuel
Start Date: 2018-07-12	End Date:	Datum: NAD83	UTM Zone: 14
Start Time: 1220	End Time:	Easting: 687945	Northing: 4940669
*Use 24 hour time format	*Use yyyy-mm-dd date format	*Easting should be 6 digits	*Northing should be 7 digits

Detector Information	Microphone Information		Anabat Only
Detector Model: SM4	Sound Reception: None		Audio Div (Should be 16)
Detector Serial: S4U05101			
Detector Housing: None	Mic Serial: MU106486	Mic Height (m): 3	Data Div (Should be 16)
	Mic Horizontal Orientation (0-360°): 195		
Battery Source: Internal	Mic Vertical Orientation (°): 0		

All Detector Checklist

Date (yyyy-mm-dd)	Time (24 Hour)	Battery Voltage (V)	Perform Mic Check	Inspect Cables; Mic Holder; Housing	Replace Data Card(s)	Change Battery	Comments (Detector set up, picked up, moved, knocked over, vandalized, etc.)	Anabat Only: Sensitivity Setting (Normally 6)	Test Indicators ("Data" lit and static heard)	Set Volume (Lowest Setting)	LED Indicator Lights (Should be Standby, unless between 10:00 and 8:00)
2018-07-12	1220	6.4	✓	✓	✓	✓	Detector set up				Record Standby Status Error Data
											Record Standby Status Error Data
											Record Standby Status Error Data
											Record Standby Status Error Data

Habitat Composition within 100m (i.e. the sketched area)

[1] Primary Habitat: Field Edge	% Forest:
Forest Type: Deciduous	% Open/Ag:
Dominant Tree Species: Populus deltoides, Fraxinus pennsylvanica	% Water:
Stand Age (DBH): Late-successional (25 - 38 cm)	
Preferred Roost Tree Species Present:	
Topography: Flat	

[3]Habitat Description within 100m (i.e. the sketched area)

Detector place at meeting point between two tree lines.

Photo Checklist

Detector Location: ✓ (Detector + All Surrounding Habitat)	Detector Orientation: ✓ (Detector + Bat Feature Sampled)	Detection Cone: ✓ (All Space Sampled)

[1] Choices: Bridge, Bottomland Forest, Cave Entrance, Creek/Riparian, Field Edge, Mine Portal, Open Field, Pond, Structure, Upland Forest, or Other (Give Brief Description)
[2] Map out habitat features within a 100 m radius of the detector (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.).
[3] Provide a written description of the surrounding habitat within a 100m radius of the detector, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).

Wind Power GeoPlanner™

Microwave Study

Tatanka Wind Project

Prepared on Behalf of
Tatanka Ridge Wind, LLC

May 2, 2019

COMSEARCH®
A CommScope Company

Table of Contents

1. Introduction - 1 -

2. Project Overview - 1 -

3. Two-Dimensional Fresnel Zone Analysis - 2 -

4. Conclusion - 7 -

5. Contact - 7 -

1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Tatanka Wind Project

County: Deuel

State: South Dakota

Number of Turbines: 62

Blade Diameter: 127 meters

Hub Height: 88.6 meters

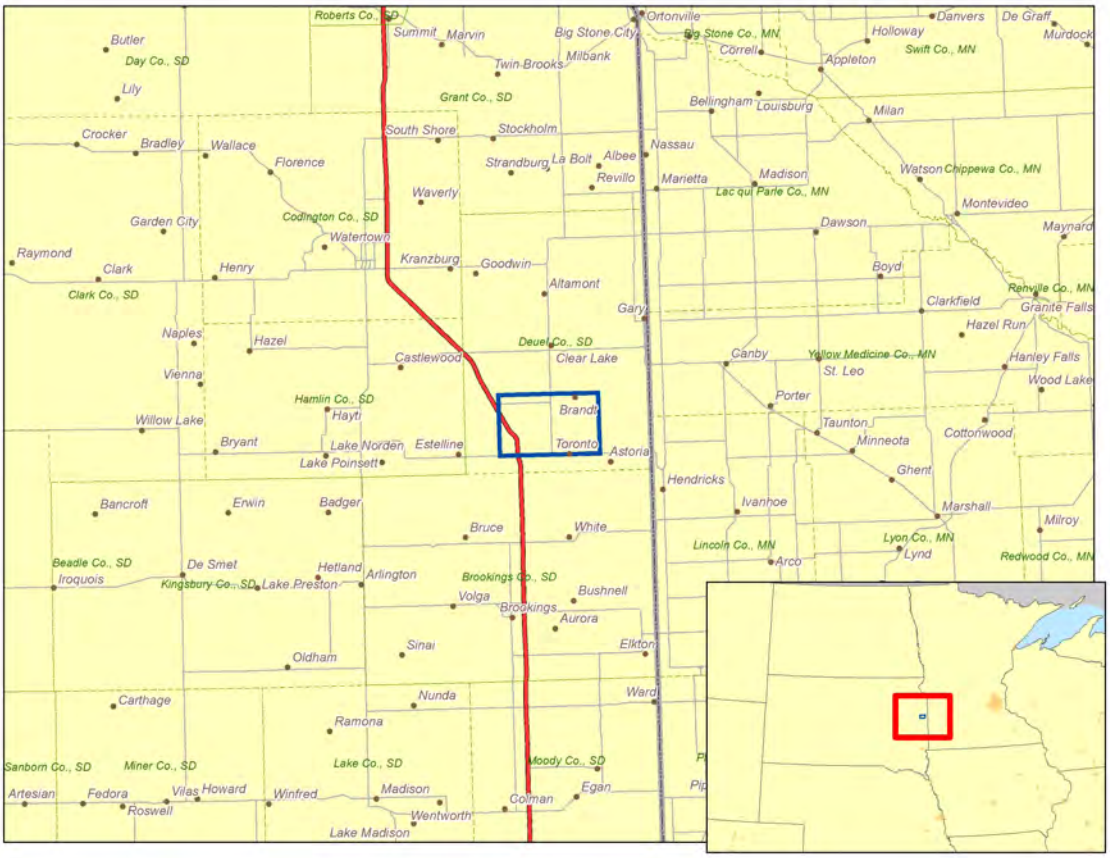


Figure 1: Area of Interest

3. Two-Dimensional Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2] and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

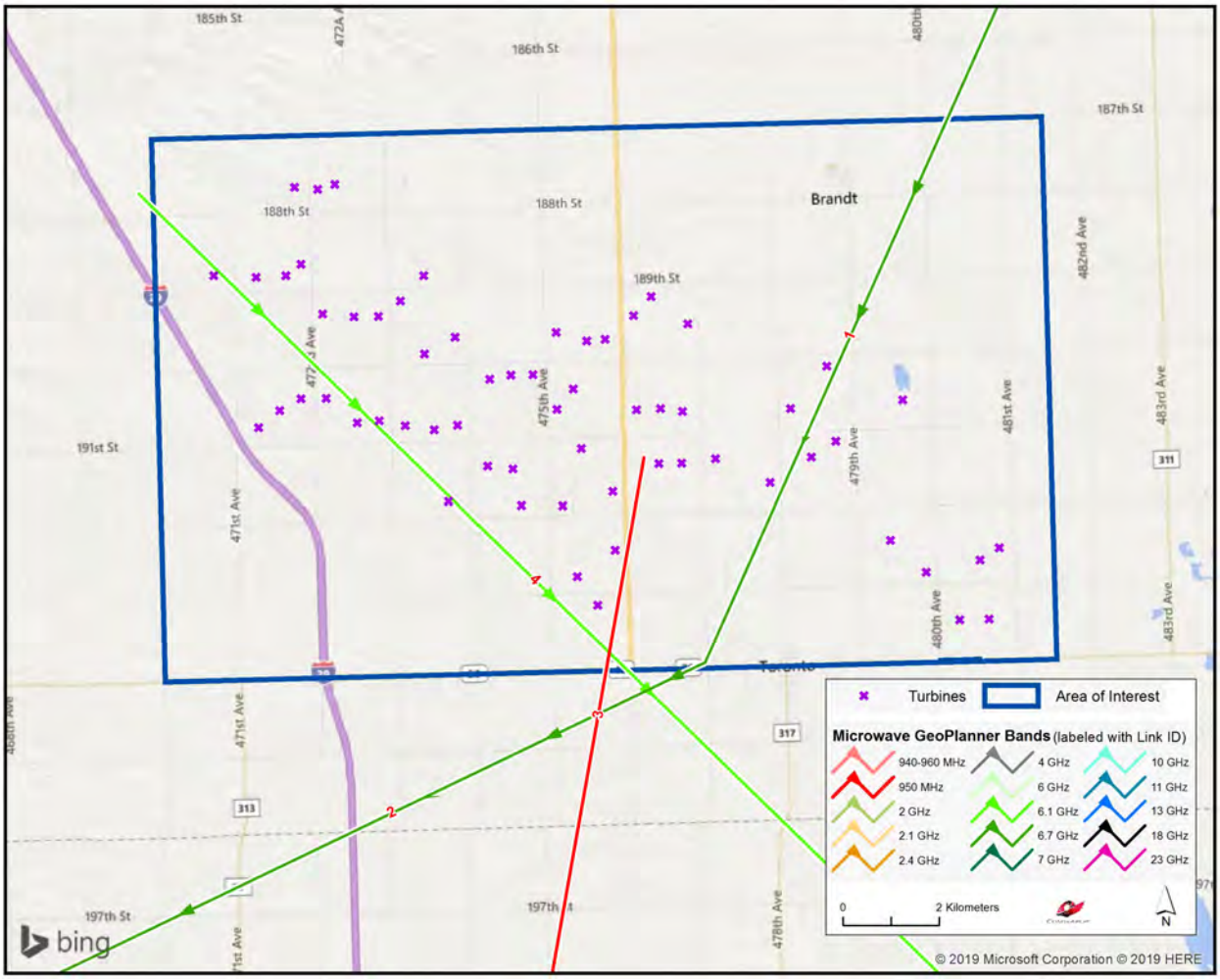


Figure 2: Microwave Paths that Intersect the Area of Interest

[1] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

[2] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

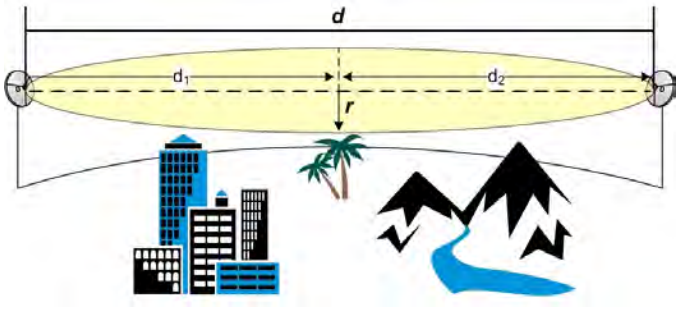
ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Licensed	WHI614	WHI615	6.7 GHz	34.05	Otter Tail Power Company
2	Licensed	WHI615	WQRX854	6.7 GHz	47.55	Otter Tail Power Company
3	Licensed	WPUI339	RXONLY	950 MHz	35.03	Alpha 3E Licensee, LLC
4	Licensed	WQDT287	WQDT289	6.1 GHz	38.91	Northern Border Pipeline Company

Table 1: Summary of Microwave Paths that Intersect the Area of Interest
(See enclosed mw_geopl.xlsx for more information and GP_dict_matrix_description.xls for detailed field descriptions)

Verification of Coordinate Accuracy
It is possible that as-built coordinates may differ from those on the FCC license. For this project, three paths cross within close proximity of the proposed turbines and the tower locations for these paths will have a critical impact on the result. Therefore, we verified these locations using aerial photography. Some of the towers were found to be slightly off and were moved to their locations based on the aerial photos[3].

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,
r = Fresnel Zone radius at a specific point in the microwave path, meters
n = Fresnel Zone number, 1
F_{GHz} = Frequency of microwave system, GHz
d_1 = Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2 = Distance from antenna 2 to a specific point in the microwave path, kilometers

The calculated Fresnel Zone shows the narrow area of signal swath and is calculated for each microwave path in the project area. In general, this is the area where the planned wind turbines

[3] See enclosed mw_geopl.shp (adjusted locations based on aerial photography/basis for report images and results) and mw_geopl_fcc.shp (locations solely based on FCC licensed information) for details.

should be avoided, if possible. Likewise, Comsearch recommends that an area directly in front of each microwave antenna should be avoided. This corresponds to the Consultation Zone which measures 1 kilometer along the main beam of the antenna and 24 ft (7.3 meters) wide. A depiction of the individual Fresnel and Consultation Zones is shown in Figures 3 through 5, and is also included in the shapefiles[4,5].

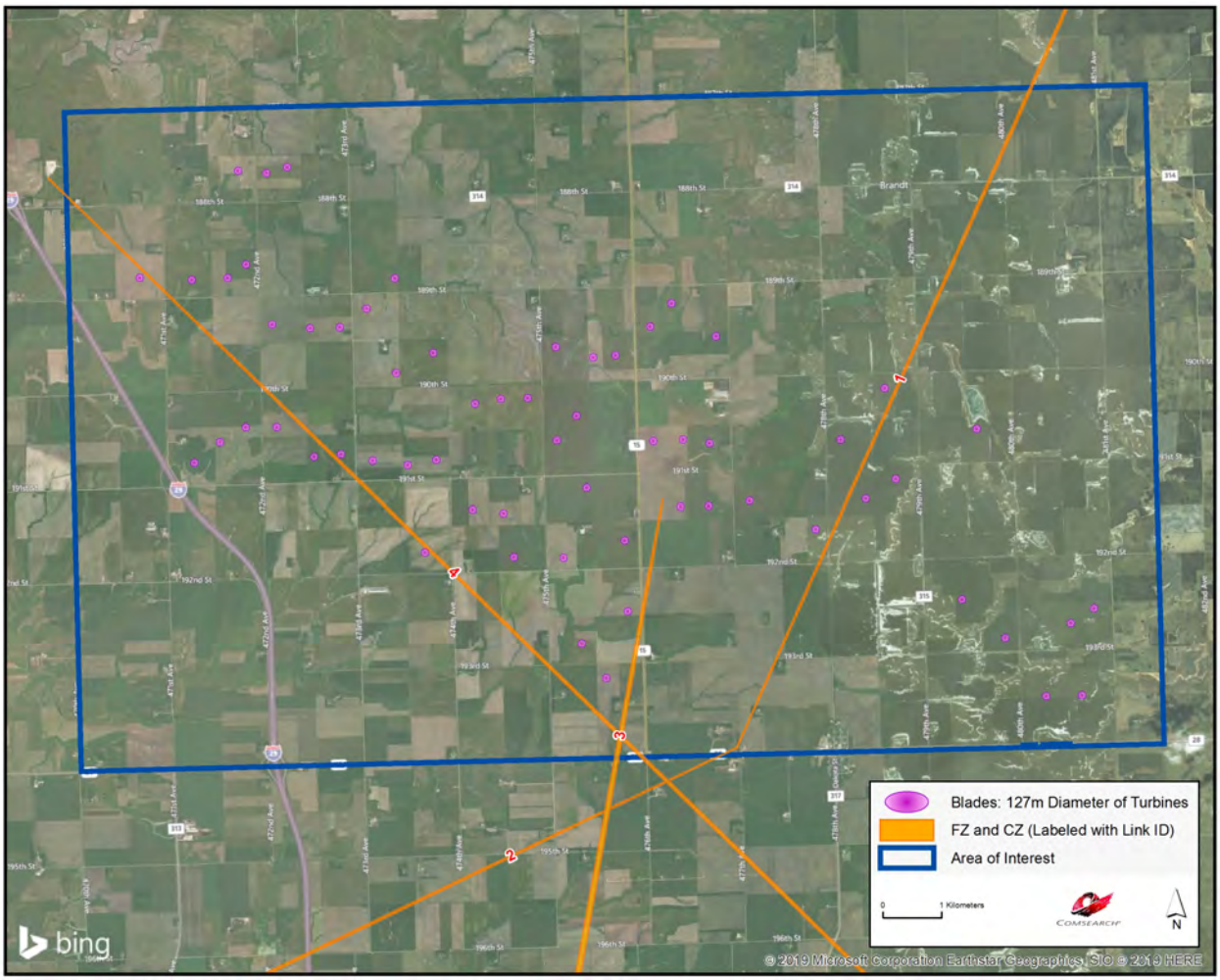


Figure 3: Microwave Paths with Fresnel and Consultation Zones

[4] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 14 projected coordinate system.

[5] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

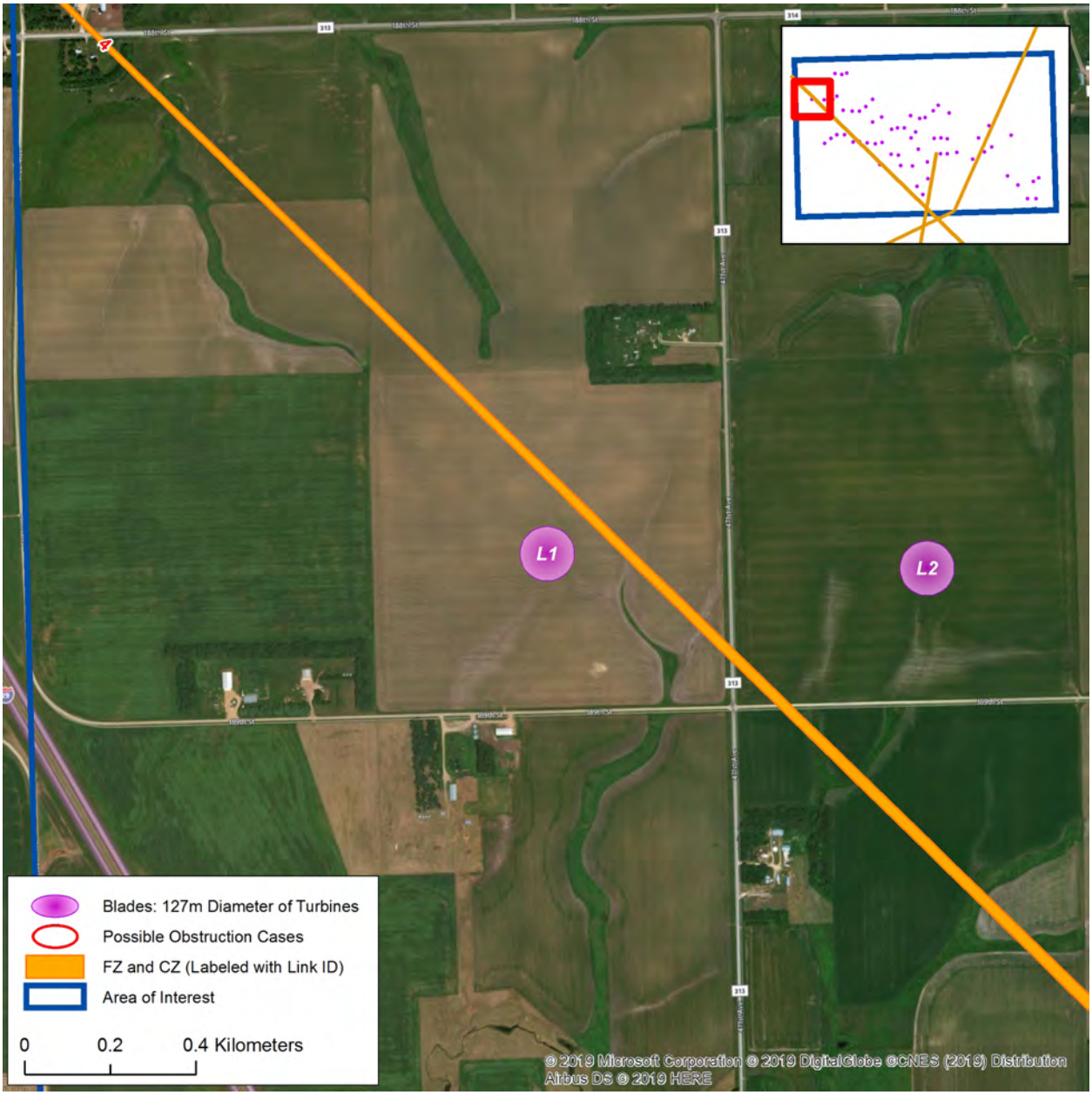


Figure 4: Microwave Paths with Fresnel and Consultation Zones

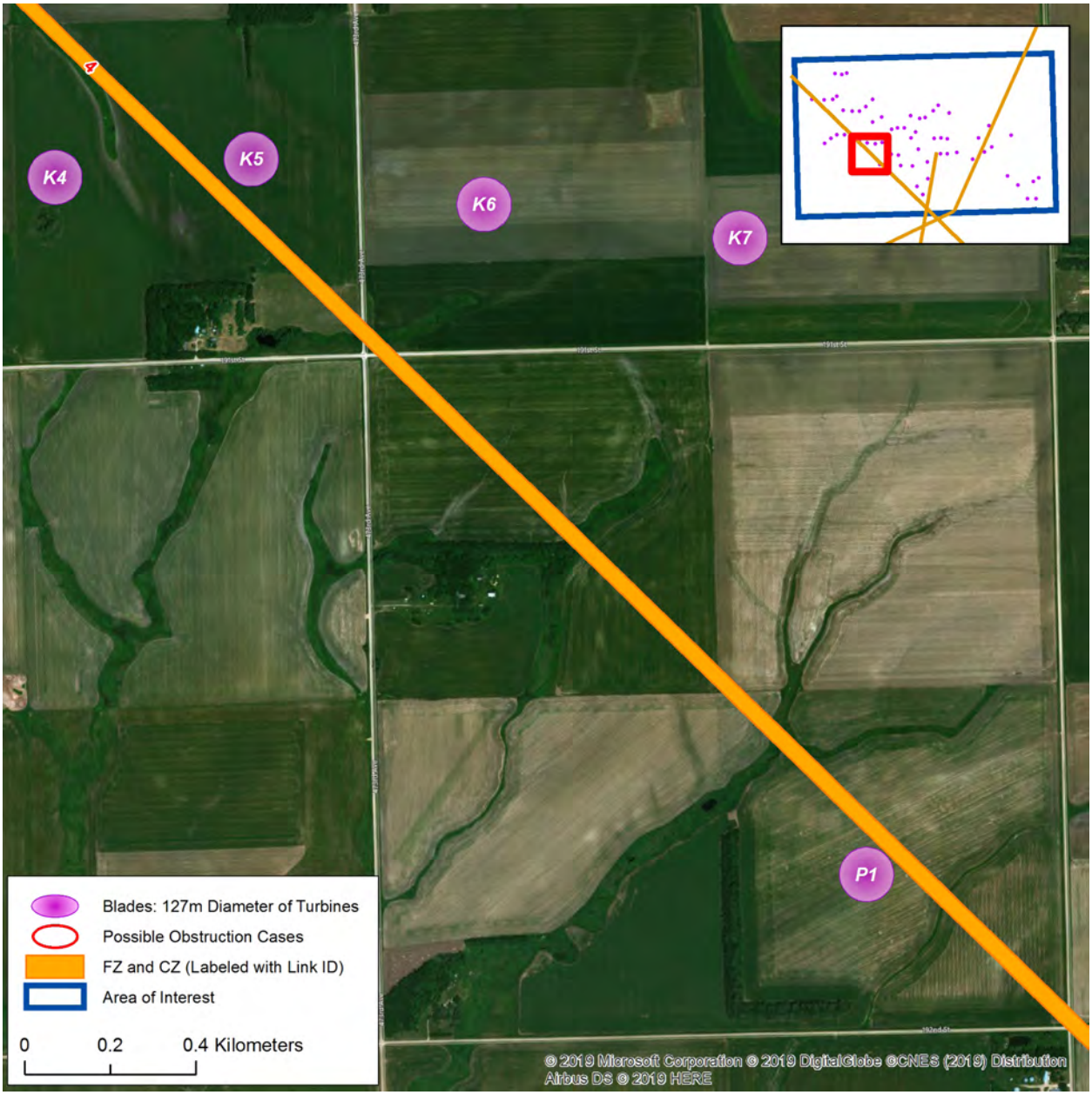


Figure 5: Microwave Paths with Fresnel and Consultation Zones

4. Conclusion

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting the Fresnel Zones
4	0	62	0

Table 2: Fresnel Zone Analysis Result

Our study identified four microwave paths intersecting the Tatanka Wind Project area of interest. The Fresnel Zones for these microwave paths were calculated and mapped in order to assess the potential impact from the turbines. A total of 62 turbines were considered in the analysis, each with a blade diameter of 127 meters and a hub height of 88.6 meters. Of those turbines, none were found to have potential obstruction with the microwave systems in the area.

5. Contact

For questions or information regarding the Microwave Study, please contact:

Contact person: David Meyer
Title: Senior Manager
Company: Comsearch
Address: 19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone: 703-726-5656
Fax: 703-726-5595
Email: dmeyer@comsearch.com
Web site: www.comsearch.com

Tatanka Wind Project

Avangrid Renewables

Deuel County, South Dakota

Microwave Path Analysis

April 2, 2019

Capitol Airspace Group
capitolairspace.com
(703) 256 - 2485

Capitol Airspace Group
5400 Shawnee Road, Suite 304
Alexandria, VA 22312
703-256-2485
capitolairspace.com

Summary

Capitol Airspace conducted a microwave path analysis for the Tatanka wind project in Deuel County, South Dakota. The purpose for this analysis was to identify licensed and applied coordinated non-federal microwave paths that could limit the placement of wind turbines with a 90 meter hub height and 127 meter rotor diameter. At the time of this analysis, 62 individual wind turbine locations had been identified (black points, ***Figure 1***). This analysis assessed each location (including its rotor swept volume) to determine if it could obstruct Fresnel zones associated with microwave paths in proximity to the Tatanka wind project.

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 sited 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.

Four unique microwave links overlie the Tatanka wind project (blue, ***Figure 1***). However, none of the proposed wind turbines (including their rotor swept volume) should obstruct the associated three-dimensional Fresnel zones.

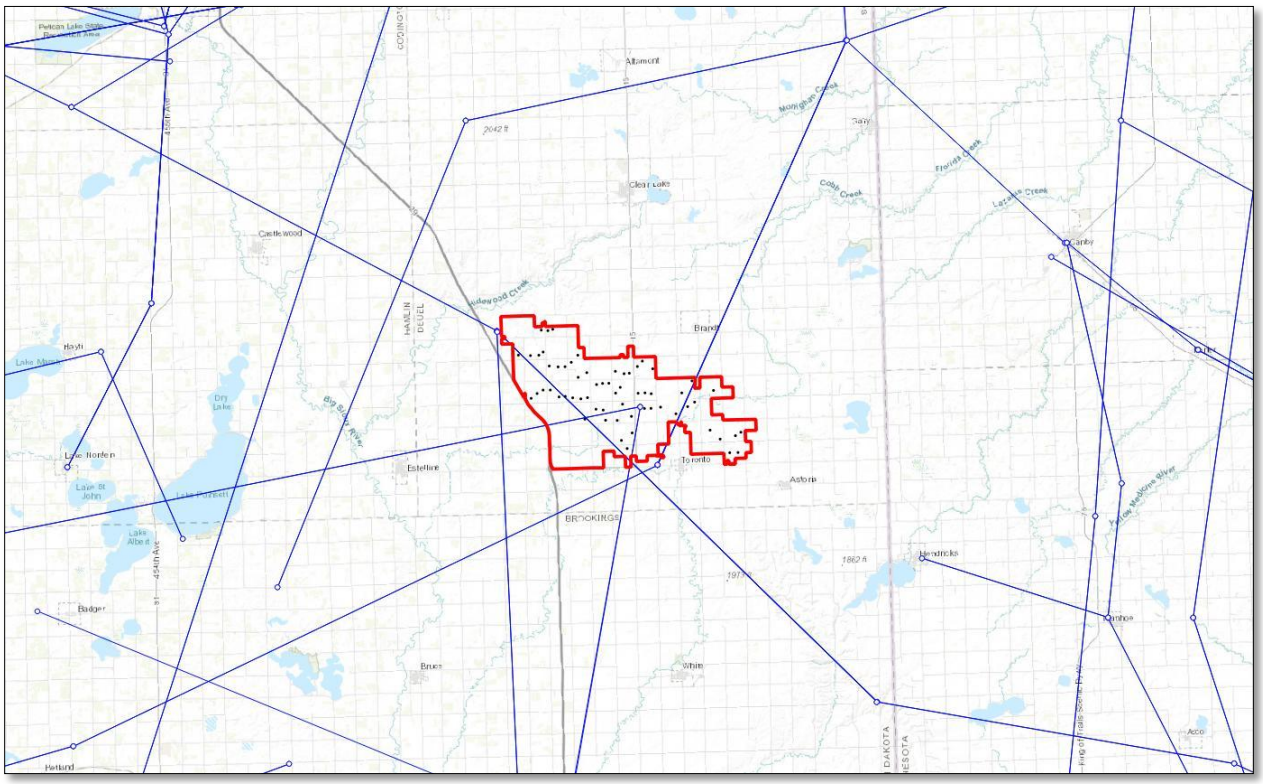


Figure 1: Licensed microwave paths (blue) in proximity to the Tatanka wind project

Capitol Airspace maintains a database obtained from the FCC which is updated on a daily basis. The results of this analysis are based on FCC data available as of the date of this report.

Methodology

Capitol Airspace studied the proposed project based upon location information provided by Avangrid Renewables. Using this information, Capitol Airspace used a Geographic Information System (GIS) to determine proximity to both licensed and applied coordinated non-federal microwave paths contained in the Federal Communication Commission (FCC) Universal Licensing System (ULS) database.

This analysis considers impact on microwave paths resulting from the physical blockage of the first Fresnel zone (***Figure 2***). The first Fresnel zone is a three dimensional volume whose radius at a given point is calculated using the path frequency and distance from the transmitting and receiving antennas. The Fresnel zone radius is largest at the path midpoint (where $d_1 = d_2$). Lower frequencies result in larger Fresnel zone radii for a given path and are typically associated with longer paths. Higher frequencies result in smaller Fresnel zone radii for a given path and are typically associated with shorter paths.

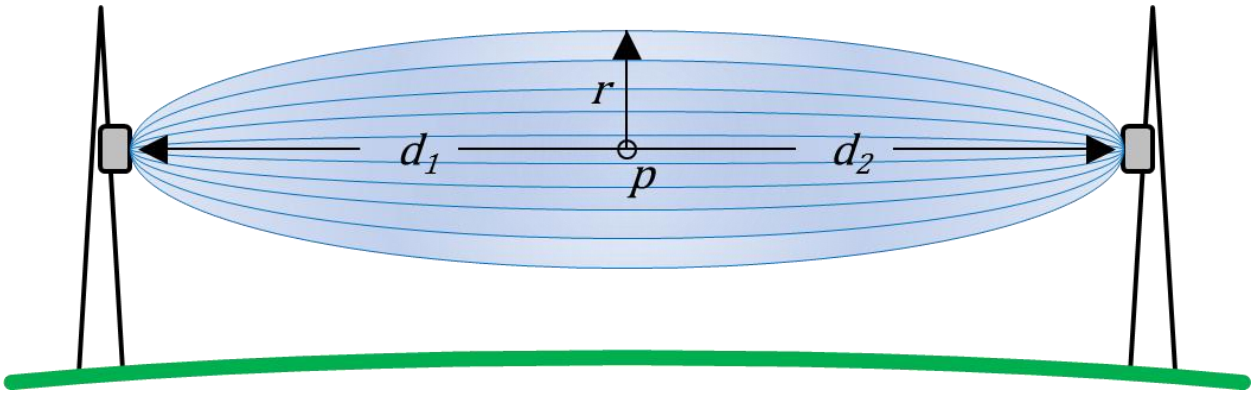


Figure 2: Fresnel zone example

In many cases, ULS database microwave transmitter and receiver antenna locations are inaccurate (e.g. ***Figure 3***). Available satellite and aerial imagery was used to improve the coordinates for locations associated with microwave paths in proximity to the defined study area.

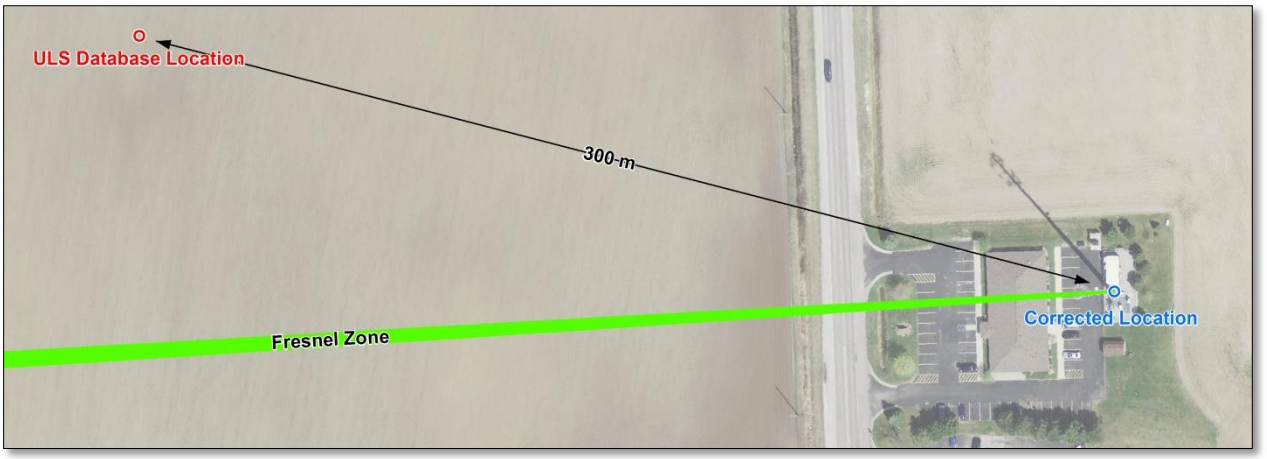


Figure 3: Example of using aerial imagery to correct erroneous ULS database antenna location

Findings

Six paths associated with four microwave links overlie the Tatanka wind project (***Table 1*** & ***Figure 4***).

Licensee	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

Table 1: Microwave paths with Fresnel zones overlying the Tatanka study area

Conclusion

The results of this analysis indicate that six paths associated with four unique microwave links overlie the Tatanka wind project. However, none of the proposed wind turbines (including their rotor swept volume) should obstruct licensed or applied non-federal microwave link Fresnel zones.

If micrositing is required or additional locations are planned, wind turbines should be sited outside of the lateral boundaries of the Fresnel zones (green, ***Figure 4***) in order to avoid the likelihood of signal blockage. Due to the relatively narrow size of most microwave path Fresnel zones, it is likely that impact on these paths can be avoided through micrositing. However, wind turbines (including the rotor-swept area) could be sited within the lateral boundaries of Fresnel zones provided they do not penetrate the three-dimensional Fresnel zone.

If you have any questions regarding the findings of this study, please contact ***Dan Underwood*** or ***Orlando Olivas*** at (703) 256-2485.

[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.

Tatanka Wind Project

Figure 4 - Microwave Path Fresnel Zones

Plot Date: 2 April 2019

Coordinate System: WGS 84 / UTM zone 14N

0 1 2 3 4 5 Kilometers

CS11

STATION GARY

OTTER TAIL POWER COMPANY
37.08km @ 6.68 - 6.84 GHz

NorthWestern Corporation
108.46km @ 959 MHz

BANCROFT

Northern Border Pipeline Company
47.07km @ 5.97 - 6.29 GHz

TORONTO M/W STATION
KDBX site

Toronto

ALPHA 3E LICENSEE LLC
35.81km @ 946 MHz

TEC studio

Lake Shokatan

Capitol Airspace Group

- Antenna Location
- Fresnel Zone (2D)
- Rotor Swept Area (based on 127 meter rotor diameter)
- Proposed Wind Turbine
- Study Area

N

Appendix J

Site Characterization Study

Site Characterization Study Report
Tatanka Wind Project
Deuel County, South Dakota

Prepared for:

Buffalo Ridge III, LLC

1125 Northwest Couch Street
Portland, Oregon 97209

Prepared by:

Janelle Rieland and Joyce Pickle

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

July 23, 2018

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Joyce Pickle	Senior Manager
Janelle Rieland	Project Manager
Brenna Hyzy	Biologist
Stuart Geiger	GIS Specialist
Carmen Boyd	Project Tracking & Data Manager
Katie Wynne	Technical Editing Coordinator
David Klein	Technical Editor

REPORT REFERENCE

Rieland, J. and J. Pickle. 2018. Site Characterization Study Report, Tatanka Wind Project, Deuel County, South Dakota. Prepared for Buffalo Ridge III, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. July 23, 2018.

TABLE OF CONTENTS

1 INTRODUCTION 1
2 PROJECT AREA 1
3 METHODS 4
4 HABITATS IN PROJECT AREA 4
4.1 Land Cover/Use 4
4.2 Wetlands and Waterbodies 6
4.3 Public Lands 8
4.4 Native Prairie Communities 10
5 SPECIAL STATUS SPECIES 11
5.1 Federally Listed Species 14
5.1.1 Red Knot 14
5.1.2 Northern Long-eared Bat 14
Habitat Requirements 14
Potential Habitat within the Project Area 16
5.1.3 Topeka Shiner 19
5.1.4 Dakota Skipper and Poweshiek Skipperling 21
5.2 State-listed Species 23
5.3 Bald and Golden Eagles 25
5.3.1 Bald Eagle 25
5.3.2 Golden Eagle 26
6 BIRD AND BAT OVERVIEW 26
6.1 Birds 26
6.1.1 Migratory Birds 27
6.1.2 USFWS Birds of Conservation Concern 27
6.1.3 Important Bird Areas 27
6.1.4 USGS Breeding Bird Survey 28
6.1.5 Raptors 28
6.2 Bats 30
7 WEG TIER 2 AND ECPG STAGE 1 QUESTION RESPONSES 30
8 References 35

LIST OF TABLES

Table 1. Land cover types present within the Tatanka Wind Project, Deuel County, South Dakota. 4

Table 2. Wetland types present within the Tatanka Wind Project, Deuel County, South Dakota. 6

Table 3. Publicly owned or managed lands within five miles of the Tatanka Wind Project, Deuel and Brookings counties, South Dakota and Lincoln County, Minnesota. 10

Table 4. Threatened and endangered species with potential for occurrence near the Tatanka Wind Project, Deuel County, South Dakota. 15

Table 5. Birds of conservation concern identified by the USFWS as being of particular concern near the Tatanka Wind Project, Deuel County, South Dakota. 27

Table 6. Bat species with potential to occur in or near the Tatanka Wind Project, Deuel County, South Dakota. 30

LIST OF FIGURES

Figure 1. Location of the Tatanka Wind Project, Deuel County, South Dakota. 2

Figure 2. Digital Elevation Model of the Tatanka Wind Project, Deuel County, South Dakota..... 3

Figure 3. Land cover types within the Tatanka Wind Project, Deuel County, South Dakota. 5

Figure 4. Wetlands and waterbodies in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota..... 7

Figure 5. Location of publicly owned or managed land in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota. 9

Figure 6. Potentially undisturbed grasslands in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota. 13

Figure 7. Potential northern long-eared bat habitat in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota. 18

Figure 8. Documented occurrences of the Topeka shiner in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota. 20

Figure 9. Federally designated critical habitat for the Dakota skipper and Poweshiek skipperling in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.....22

Figure 10. Potentially undisturbed lands and potentially suitable habitat for the Dakota skipper and Poweshiek skipperling identified during field surveys in 2015 within the Tatanka Wind Project, Deuel County, South Dakota. 24

Figure 11. Important Bird Areas in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.....29

LIST OF APPENDICES

Appendix A. Agency Environmental Review Reports

Appendix B. Representative Site Photos

NOTES ON UNITS

Imperial units are used throughout this document, with the exception of the use of meters when describing survey methodology, where metric is used to be consistent with agency guidelines. Conversions are provided below.

Unit Conversions

Imperial	Metric
1 foot	0.3048 meter
3.28 feet	1 meter
1 mile	1.61 kilometers
0.621 mile	1 kilometer
1 acre	0.40 hectare
2.47 acres	1 hectare

Common Conversions

Imperial	Metric
0.12 mile	200 meters
0.5 mile	800 meters
10 miles	16.1 kilometers

1 INTRODUCTION

Buffalo Ridge III, LLC (Buffalo Ridge III), a subsidiary of Avangrid Renewables, LLC, has proposed development of the Tatanka Wind Project (Project) located in Deuel County, South Dakota (Figure 1). Buffalo Ridge III contracted Western EcoSystems Technology, Inc. (WEST) to conduct baseline ecological studies at the proposed Project. The purpose of this report is to describe biological resources present within and surrounding the proposed Project and to identify potential risks to biological resources that could result from construction and operation of the Project. This report follows the guidelines for a Tier 2 Site Characterization Study set forth in the US Fish and Wildlife Service (USFWS) *Land-based Wind Energy Guidelines* (WEG; USFWS 2012) and the Stage 1 initial site assessment as described in the *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013a) and addresses the Tier 2 and Stage 1 questions, respectively, in these guidelines.

2 PROJECT AREA

The proposed Project is located in Deuel County, South Dakota approximately five miles (mi) west of the South Dakota/Minnesota border, and directly north of the town of Toronto, South Dakota (Figure 1). The area within the boundary of the Project encompasses 22,905 acres (ac; 36 square miles [mi^2]).

The Project is located within the Northern Glaciated Plains Level III Ecoregion, which covers much of the eastern portion of South Dakota (US 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 seasonal wetlands that are favorable for duck nesting and migration. As is typical of this region, elevations range from approximately 1,663 to 2,024 feet (ft) within the Project boundary (US Geological Survey [USGS] 2016b; Figure 2). 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 mi in length and 100 mi 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 et al. 1998)

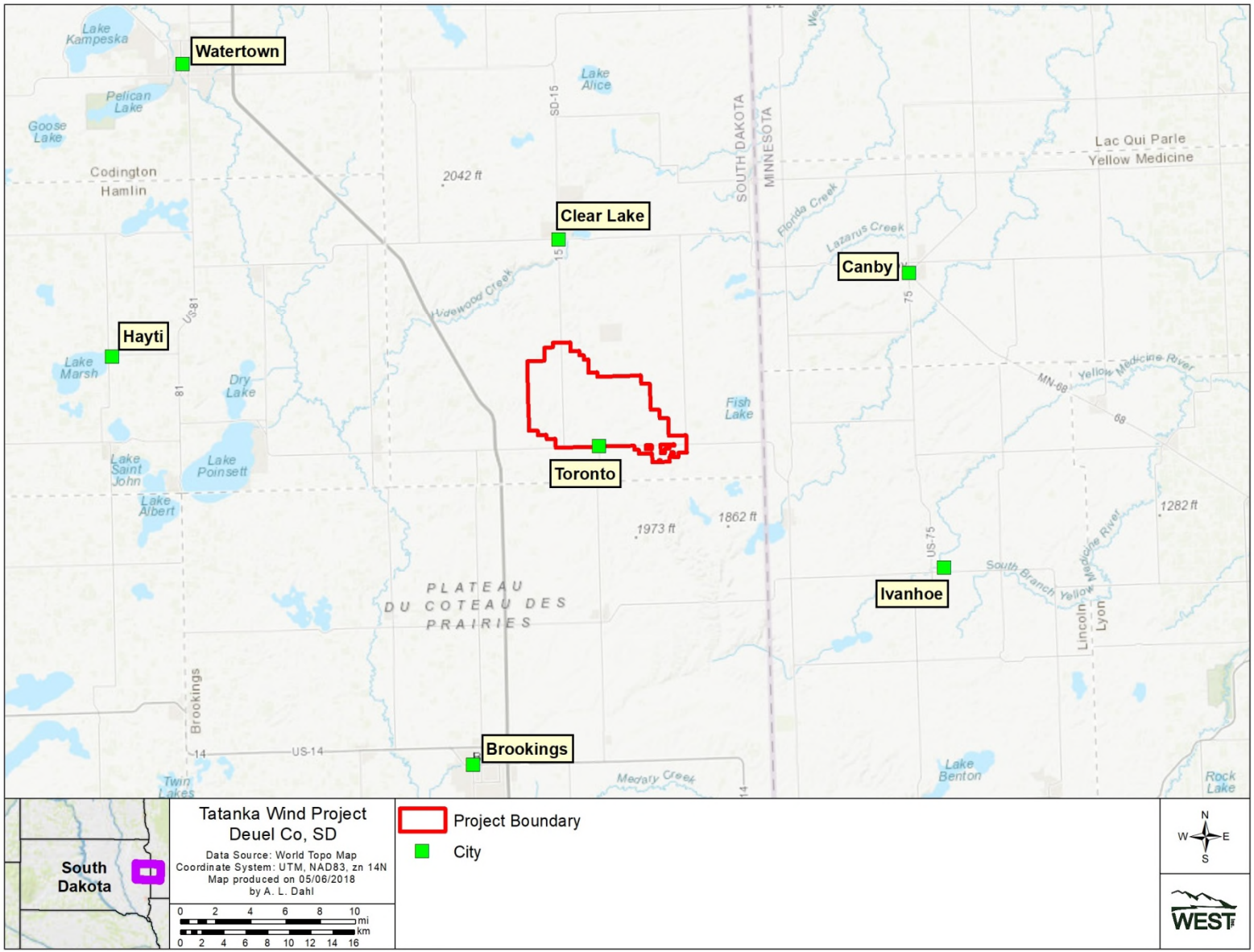


Figure 1. Location of the Tatanka Wind Project, Deuel County, South Dakota.

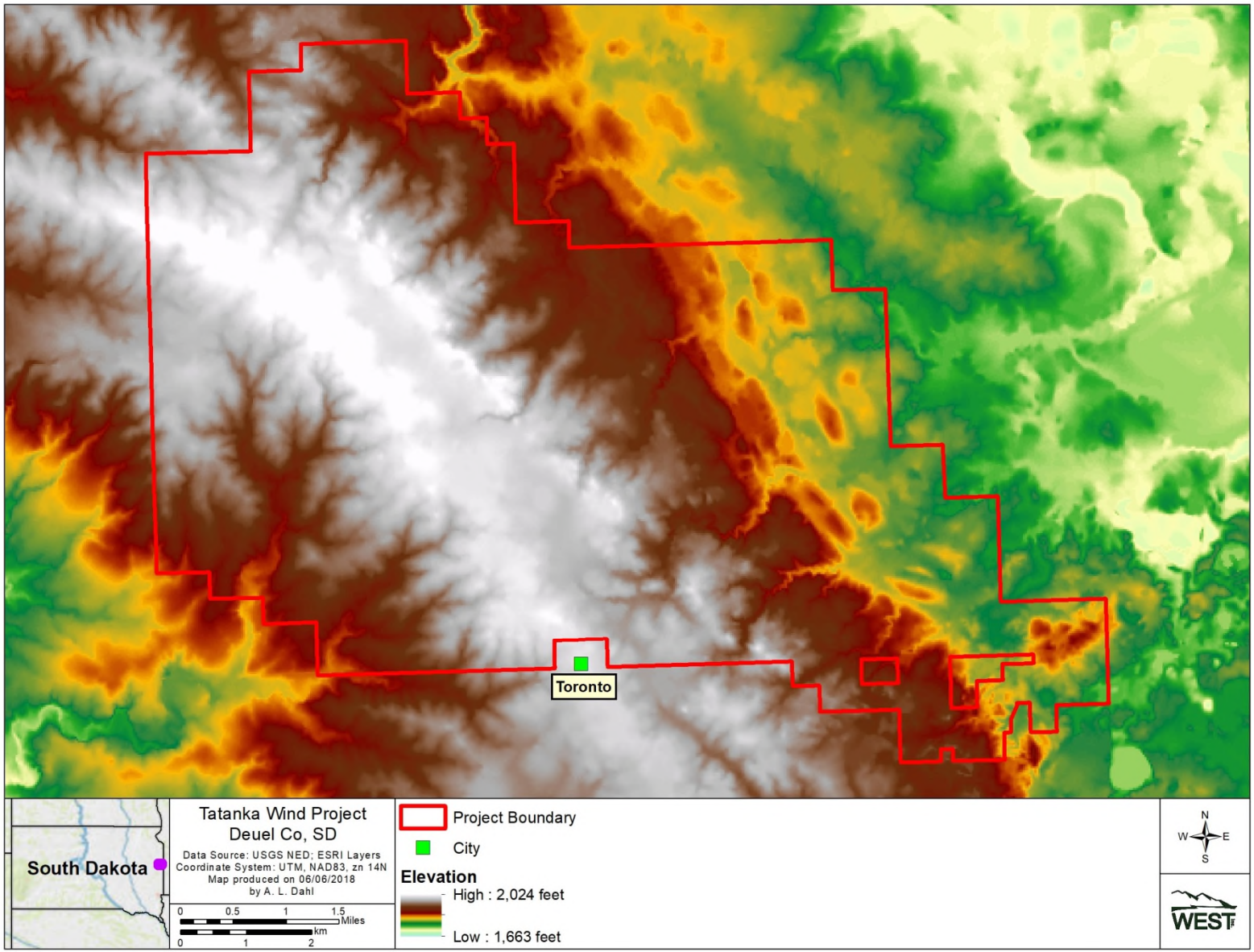


Figure 2. Digital Elevation Model of the Tatanka Wind Project, Deuel County, South Dakota.

3 METHODS

Biological resources within the Project were evaluated through a review of existing publicly available data, including published technical literature, online articles, aerial photographs, maps, and public datasets. An online environmental review was conducted for the Project using the USFWS Information for Planning and Consultation (IPaC) website to identify known federally listed species and environmentally sensitive resources located within the Project boundary. In addition, the South Dakota Game, Fish, and Parks (SDGFP) was contacted to obtain Natural Heritage Program (NHP) records of known federally and state-listed species and other environmentally sensitive resources located in or near the Project boundary. The results of these federal and state agency environmental reviews are provided in Appendix A.

A reconnaissance site visit was completed on May 22, 2018 to evaluate current land cover, characterize environmentally sensitive areas, and identify areas that may provide suitable habitat for eagles or other species of special concern within the Project boundary. Representative photographs were taken during the field review and are provided in Appendix B.

4 HABITATS IN PROJECT AREA

Publicly available data and aerial photographs were reviewed to assess potential wildlife habitat and identify any environmentally sensitive features within the Project boundary. This assessment included land cover, wetlands and waterbodies, public lands, native prairie communities in or near the Project area, which are discussed below.

4.1 Land Cover/Use

Based on USGS National Land Cover Data (NLCD; USGS NLCD 2011, Homer et al. 2015), the majority (89.4%) of land within the Project boundary consists of cultivated cropland (65.1%) and herbaceous land (24.3%; Table 1 and Figure 3). Other land cover types that compose at least 1% of the Project area include developed open space (primarily roads; 4.7%), hay/pasture (3.9%), and emergent herbaceous wetlands (1.1%).

Table 1. Land cover types present within the Tatanka Wind Project, Deuel County, South Dakota.

	Project Area	
Cover Type	**Acres**	**Percent (%)**
Cultivated Crops	14,907	65.1
Herbaceous	5,576	24.3
Developed	1,086	4.7
Hay/Pasture	893	3.9
Emergent Herbaceous Wetlands	256	1.1
Deciduous Forest	127	0.6
Open Water	60	0.3
Total	**22,905**	**100**

Data Source: USGS NLCD 2011, Homer et al. 2015

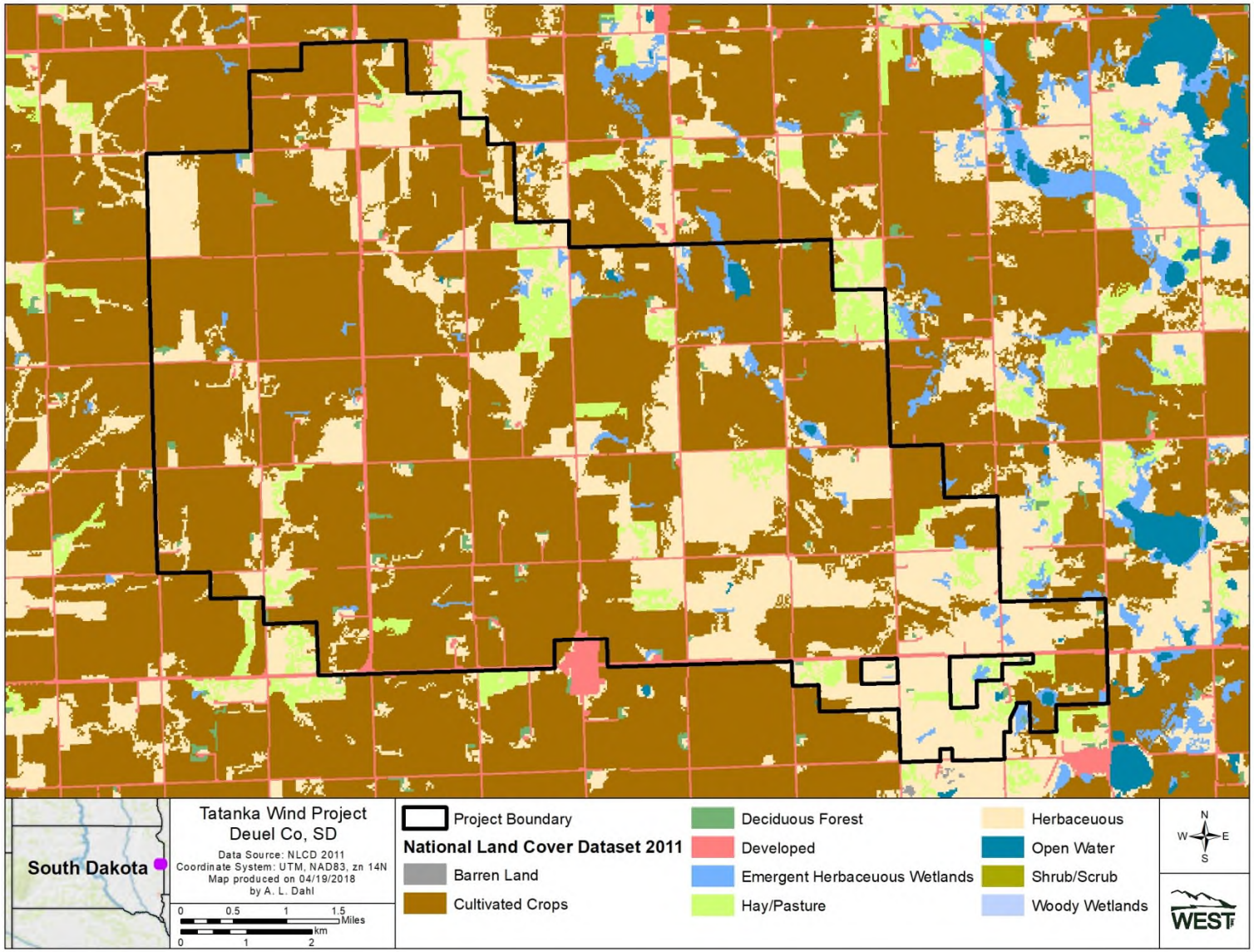


Figure 3. Land cover types within the Tatanka Wind Project, Deuel County, South Dakota. (US Geological Survey National Land Cover Database 2011, Homer et al. 2015).

Based on the site visit and consistent with the publicly available land cover data presented in Table 1, land cover within the Project boundary is predominantly cultivated croplands. Although corn (*Zea mays*) appeared to be the primary cultivated crop, many of the fields had not yet been planted at the time of the site visit, which is most likely attributable to the Spring of 2018 having cooler temperatures and higher amounts of snow than average (National Oceanic and Atmospheric Administration, National Weather Service 2018). Herbaceous land is present throughout the Project area, and it is concentrated within an area extending from the upper northcentral portion of the Project to the southeastern portion of the Project. During the site visit, cattle grazing was observed within herbaceous lands in the southeastern portion of the Project. Wooded areas within the Project boundary are limited to small woodlots and windbreaks, which are associated with most of the farmsteads.

4.2 Wetlands and Waterbodies

National Wetlands Inventory (NWI) data and the USGS, National Hydrography Dataset (NHD; USFWS NWI 2014, USGS NHD 2016c) indicate that wetlands and other waters of the United States (WOUS; e.g., rivers, streams) occupy a small percentage (2.9% or 660 ac) of the Project area (Figure 4; Table 2). Numerous waterbodies are present within the Project boundary, most of which are tributaries to Cobb Creek, Bullhead Run, North Deer Creek, and Peg Munky Run. The predominant wetland type within the Project is freshwater emergent wetland (95.1%).

Table 2. Wetland types present within the Tatanka Wind Project, Deuel County, South Dakota.

	Wetland Area	
Wetland Type	**Acres**	**Percent (%)**
Freshwater Emergent Wetland	628	95.1
Freshwater Pond	25	3.8
Freshwater Forested/Shrub Wetland	7	1.1
Total	**660**	**100**

Data Source: USFWS NWI 2014, USGS NHD 2016c

Temporary and seasonal wetlands account for approximately 92% of the wetlands within eastern South Dakota (Johnson and Higgins 1997), most of which are depressional wetlands known as prairie potholes. The majority of the wetlands present within the Project boundary appear to be isolated wetlands that may be cultivated during dryer portions of the year. In addition, several small, freshwater forested/shrub wetlands and freshwater ponds are scattered throughout the central portion of the Project area. Although data from the USGS NLCD (Figure 3; Table 1), which is based on 2011 Landsat satellite imagery, indicate that substantially fewer acres of emergent wetlands are present within the Project (about 372 ac) than the NWI data, NWI data is presented below because it has been determined to be much more accurate in identifying and delineating wetlands than the USGS NLCD data (Handley and Wells 2009).

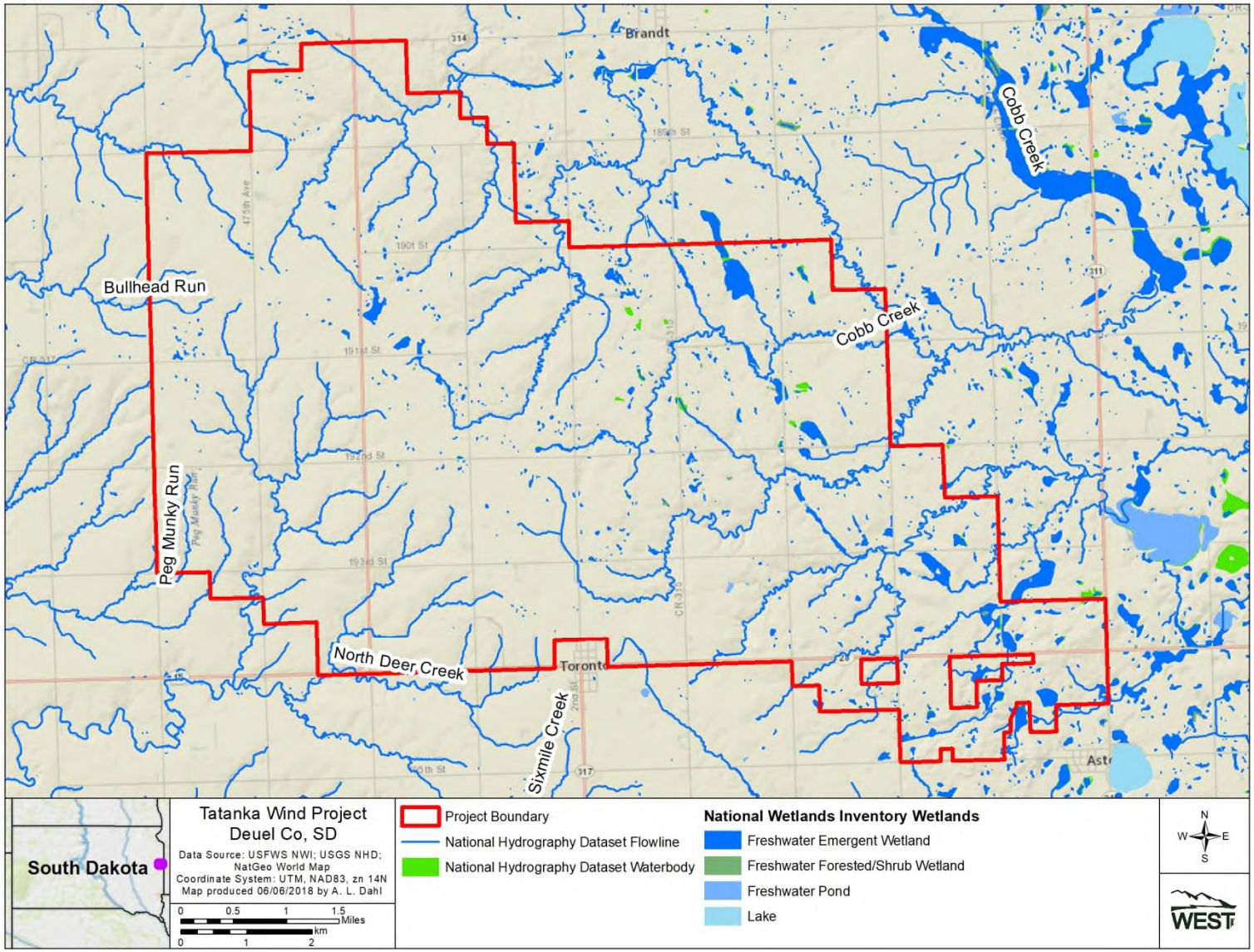


Figure 4. Wetlands and waterbodies in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota (USFWS NWI 2014, USGS NHD 2016c).

Many of the wetlands identified by the NWI are isolated wetlands located within agricultural fields that do not appear to have a significant nexus with traditional navigable waters. These isolated wetlands would likely not be considered jurisdictional WOUS by the US Army Corps of Engineers (USACE). In contrast, waterbodies and wetlands directly adjacent to streams within the Project boundary would likely be considered WOUS, and thus regulated by the USACE under Section 404 of the Clean Water Act (CWA; 1972). If wetland impacts are anticipated, wetland delineations should be conducted in accordance with the *1987 Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* (USACE 2010), and the USACE should be consulted on permit requirements.

4.3 Public Lands

There are a total of eight federally owned or managed areas within the Project boundary, including one Waterfowl Production Area (WPA), two parcels that contain USFWS grassland easements, and five parcels that contain wetland basins protected by USFWS wetland easements (Figure 5, Table 3). These managed areas occupy a total of 1,003 ac of land within the eastern half of the Project; Deuel County WPA 48 occupies 33 ac, the two adjacent parcels with grassland easements occupy 102 ac, and the five parcels that contain wetland basins protected by USFWS easements occupy 868 ac of land.

WPAs are part of the USFWS' National Wildlife Refuge System, and have either been purchased as public land or protected through perpetual easement. As such, if impacts on Deuel County WPA 48 cannot be avoided, coordination with USFWS should occur in order to develop minimization measures and obtain authorization.

The USFWS administers a wetland and grassland conservation easement management program for participating private lands in the Prairie Pothole Region of the U.S.; 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, it would be expected that a subset of the 868 ac covered by the parcels with wetland easements would actually be 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.

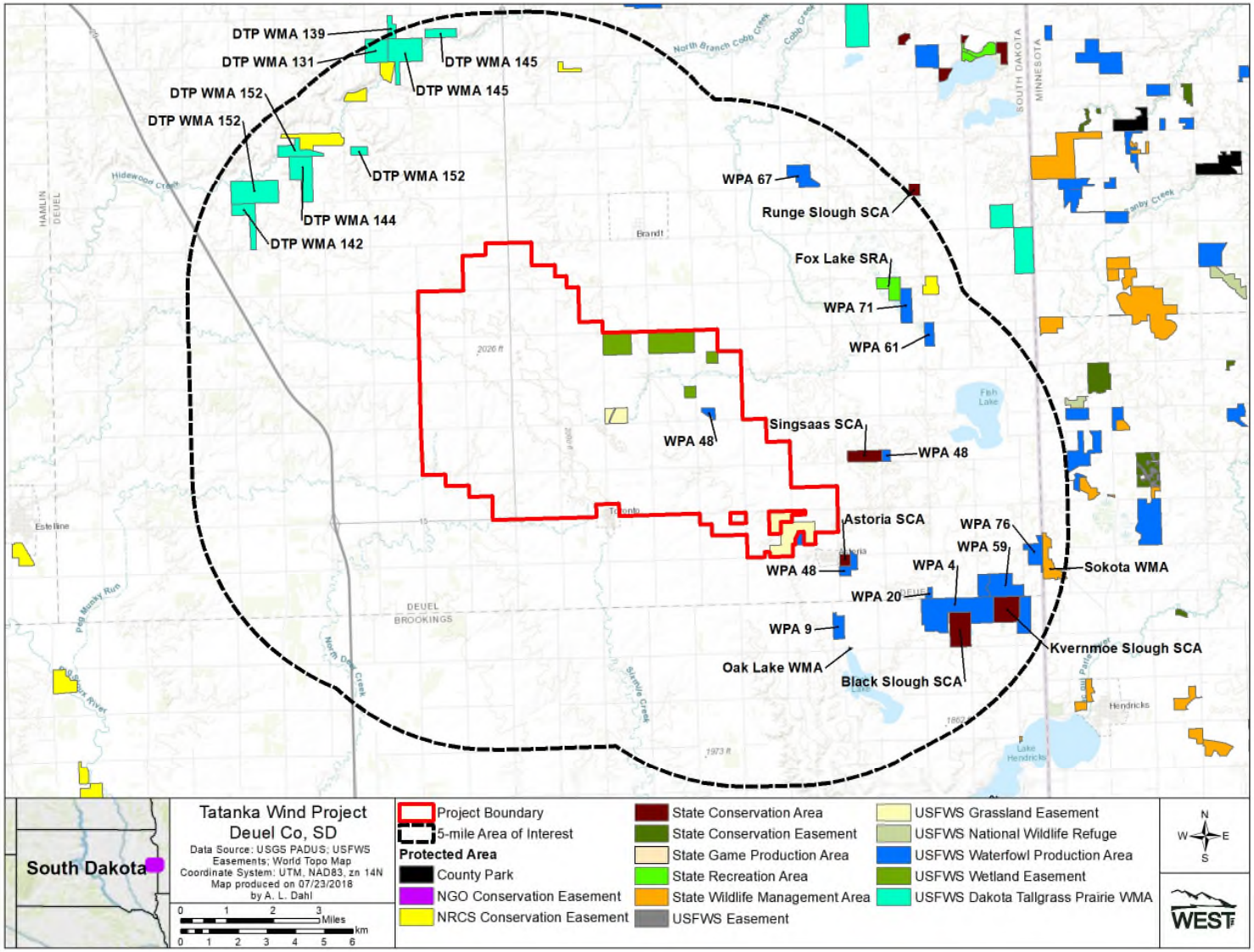


Figure 5. Location of publicly owned or managed land in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.

Table 3. Publicly owned or managed lands within five miles of the Tatanka Wind Project, Deuel and Brookings counties, South Dakota and Lincoln County, Minnesota.

Land Name	County, State	Land Ownership	Distance and Direction from the Project
Within the Project Boundary			
Deuel County WPA 48 [a]	Deuel, SD	Federal	NA
Grassland Easement (2 parcels)	Deuel, SD	Private [b]	NA
Wetland Easement (5 parcels)	Deuel, SD	Private [b]	NA
Within Five Miles of the Project Boundary			
Deuel County WPA	Deuel, SD	County	Adjacent to the south
Wetland Easement	Deuel, SD	Private [b]	Adjacent to the south
Astoria SCA	Deuel, SD	State	0.5 mi to the south
Singsaas SCA	Deuel, SD	State	0.6 mi to the southwest
Brookings County WPA 9	Brookings, SD	Federal	1.9 mi to the south
Brookings County WPA 4	Brookings, SD	Federal	2.3 mi to the southeast
Oak Lake WMA	Brookings, SD	State	2.4 mi to the south
Deuel County WPA 20	Deuel, SD	Federal	2.4 mi to the southeast
Black Slough SCA	Brookings, SD	State	3.1 mi to the southeast
Dakota Tallgrass Prairie WMA 152 [a]	Deuel, SD	Federal	3.2 mi to the northwest
Fox Lake State Recreation Area	Deuel, SD	State	3.3 mi to the west-northwest
Grassland Easement	Deuel, SD	Private [b]	3.5 mi to the northwest
Deuel County WPA 71	Deuel, SD	Federal	3.6 mi to the east
Deuel County WPA 67	Deuel, SD	Federal	3.8 mi to the northeast
Grassland Easement	Deuel, SD	Private [b]	3.9 mi to the northwest
Deuel County WPA 61	Deuel, SD	Federal	4.0 mi to the east
Floodplain Easement	Deuel, SD	Private [b]	4.3 mi to the northwest
Wetland Reserve Program	Deuel, SD	Private [b]	4.2 mi to the east
Dakota Tallgrass Prairie WMA 145 [a]	Deuel, SD	Federal	4.5 mi to the north
Sokota WMA	Lincoln, MN	State	4.6 mi to the east
Dakota Tallgrass Prairie WMA 131	Deuel, SD	Federal	4.8 mi to the north
Dakota Tallgrass Prairie WMA 139	Deuel, SD	Federal	5.0 mi to the north
Runge Slough SCA	Deuel, SD	State	5.0 mi to the northeast

[a] Deuel County WPA 48, Dakota Tallgrass Prairie WMA 145, and Dakota Tallgrass Prairie WMA 152 each have multiple areas that are managed within five miles of the Project, the closest of which is included in this table.

[b] Although these lands are privately owned, the federal easement restricts activity (within the grassland, floodplain, or wetland basin, as applicable).

In addition to the publicly owned or managed lands within the Project, and typical of this portion of the state, several WPAs, South Dakota State Conservation Areas (SCA), Wildlife Management Areas (WMA), federal conservation easements, and a state recreation area are located within 5.0 mi of the Project (Figure 5; Table 3). These managed lands are primarily associated with wetlands and waterbodies, which support waterfowl production and also have the potential to provide suitable habitat for birds and other wildlife.

4.4 Native Prairie Communities

South Dakota State University (SDSU) has developed a system for identifying potentially undisturbed land (virgin sod), which generally includes native remnant grasslands, pastures, prairies, and other natural herbaceous plant communities including natural forests, woodlands, and shrublands as well as non-developed and non-farmed wetlands (Bauman et al 2016). This

system utilized the South Dakota Farm Service Agency's Common Land Unit data along with USDA/NAIP aerial imagery to evaluate, identify, and remove all tillage and physical land disturbance history in order to identify the location of lands with the highest probability of being truly native (virgin) sod (Bauman et al. 2016). Because the potentially undisturbed lands layer was recently developed, is mapped at a scale of 1:8,000 for the entire Project, and incorporates the results of multiple years and sources of data, it serves as the primary source for identifying potential native prairie habitat for the Project.

WEST biologists compared data from the SDSU system and lands identified by the USGS NLCD (2011, Homer et al. 2015) as herbaceous or hay/pasture with current aerial imagery (ESRI 2018) in order to refine areas identified as potential native prairie (Figure 6).

Based on USGS NLCD data, although the majority (65.1%) of land within the Project boundary consists of cultivated cropland, a substantial amount of herbaceous land (24.3%) and hay/pasture (3.9%) are also present (Table 1, Figure 3). Within these grassland areas, potentially undisturbed grasslands (as mapped by SDSU) compose approximately 3,154 ac of land, which is equivalent to approximately 14% of the Project. The majority of the potentially undisturbed lands are associated with streams and adjacent hillsides in the Project (Figure 6). 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. These larger areas of potentially undisturbed grasslands include five corridors of mapped undisturbed grasslands within which smaller patches of suitable habitat for federally listed butterflies were identified during the 2015 field surveys (Figure 6; further discussion relating to the potential for these areas to contain potentially suitable habitat for federally listed butterflies is included in Section 5.1.4).

During the site visit, a Pheasants Forever Habitat Cooperator sign was observed along the edge of a grassland area identified by SDSU as potentially undisturbed land near the center of the Project, and cattle were observed grazing in several of the potentially undisturbed grassland areas (see Appendix B for photographs taken during the site visit).

5 SPECIAL STATUS SPECIES

The USFWS county distribution list of federally endangered, threatened, proposed, and candidate species (i.e., listed under the Endangered Species Act [ESA]) was reviewed to determine if any federally listed species or designated critical habitat occur in Deuel County, South Dakota (USFWS 2018d). An IPaC resource list was also generated to identify any species or resources under the jurisdiction of the USFWS with the potential to occur in the vicinity of the Project, including federally listed species and designated critical habitat. This Project-specific report is generated automatically and is included in Appendix A.

A request was submitted to the South Dakota Natural Heritage Database (SDNHD) for information regarding federally and state-listed species as well as other environmentally sensitive species or resources that are known to occur in the vicinity of the Project. The SDNHD's response to this request was provided on May 30, 2018 and is included in Appendix A.

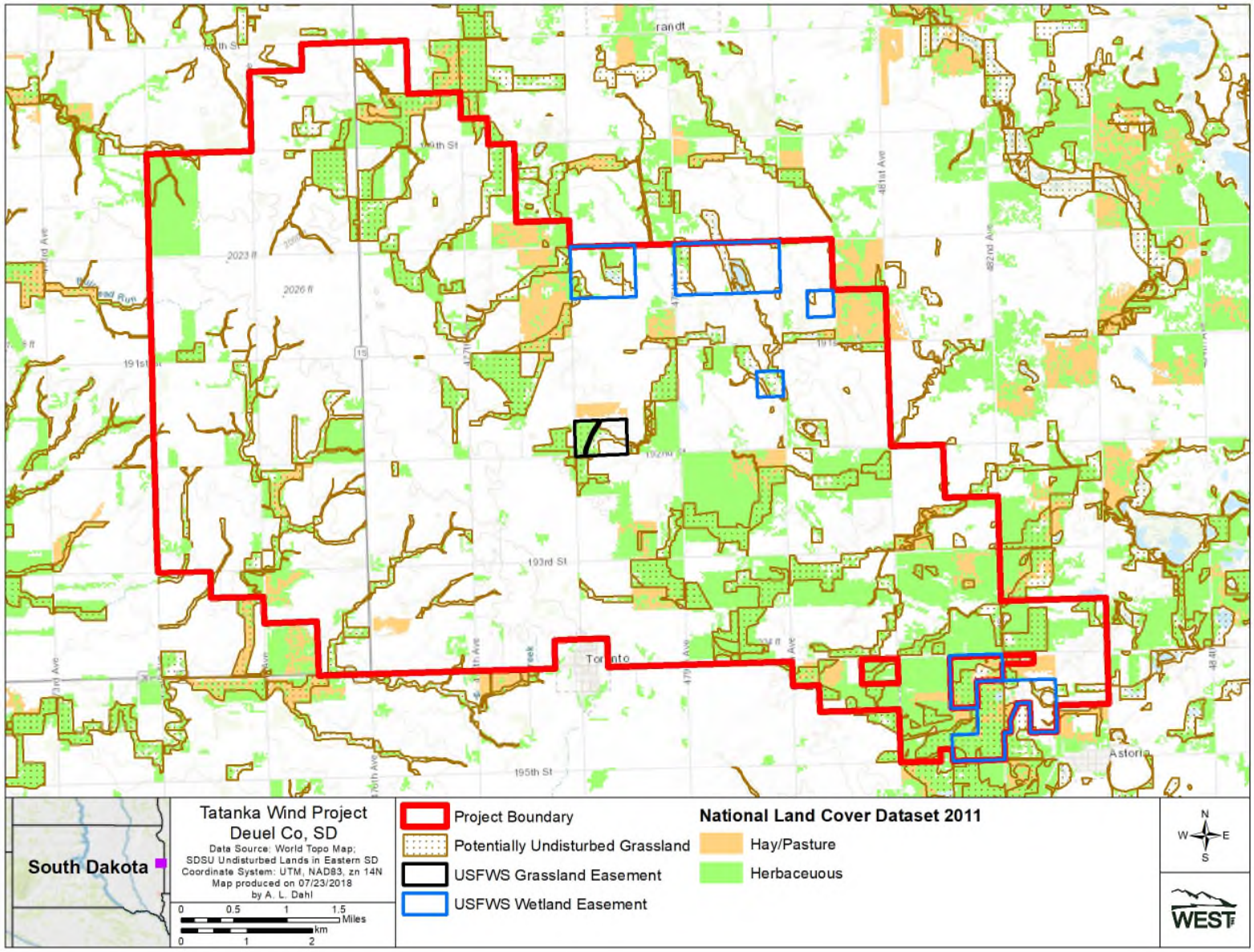


Figure 6. Potentially undisturbed grasslands in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.

5.1 Federally Listed Species

The USFWS has identified five federally listed species that have the potential to occur within or near the Project area (Table 4). These include two endangered species (Topeka shiner and Poweshiek skipperling) and three threatened species (red knot, northern long-eared bat [NLEB], and Dakota skipper), which are discussed further in the following sections.

5.1.1 Red Knot

The red knot is federally listed as a threatened species that may use stopover areas along the Northern Plains of the Midwest during migration (Baker et al. 2013). Although the IPaC report generated for the Project 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 2018). Because suitable stop-over 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 is minimal.

5.1.2 Northern Long-eared Bat

The NLEB historically occurred throughout South Dakota and was commonly encountered in summer mist-net surveys throughout much of the Midwest prior to the documentation of white nose syndrome (USFWS 2013b, 2018e). On January 14, 2016, the USFWS created a final rule under Section 4(d) of the ESA to protect NLEBs while minimizing regulatory requirements for landowners, land managers, government agencies and others within the species' range (81 Federal Register 9: 1900-1922). Recognizing that the primary threat to NLEBs comes from white-nose syndrome, this 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 (USFWS 2018f). However, the entire state of South Dakota is considered impacted per the final 4(d) rule because white-nose syndrome has been documented within 150 miles (USFWS 2018f).

<u>Habitat Requirements</u>

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

Table 4. Threatened and endangered species with potential for occurrence near the Tatanka Wind Project, Deuel County, South Dakota.

Species	Status	Habitat	Potential for Occurrence
Birds			
Red knot *Calidris canutus rufa*	FT	Stopover habitat during migration includes shorelines with an abundance of easily digested foods (invertebrates with thin or no shell) (USFWS 2013d).	Minimal potential to occur within the Project because waterbodies supporting an abundance of food sources are not present.
Mammals			
Northern long-eared bat *Myotis septentrionalis*	FT	Found in forest interior and riparian areas (Lausen 2009). Typically avoids open habitats (Owen et al. 2003). Hibernates in caves, mines, and sometimes buildings. In summer, roosts singly or in colonies underneath tree bark or in tree cavities (USFWS 2014a).	Low potential to occur within the Project during the summer due to limited bat foraging habitat. Potential to pass through Project during spring and fall migration.
Northern river otter *Lontra canadensis*	ST	Occurs in large, slow-moving waterbodies with intact riparian vegetation where medium to large fishes are present (Kiesnow and Dieter 2005).	Minimal potential to occur within the Project because large waterbodies are not present.
Fishes			
Topeka shiner *Notropis topeka (=tristis)*	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 (USFWS 2018h).	Low potential to occur in waterbodies within the western portion of the Project. Species was documented approximately 1.1 mi southwest of the Project within North Deer Creek in 2011 (SDNHD [Appendix A]).
Banded killifish *Fundulus diaphanous*	SE	Occurs in slow-moving waterbodies with abundant rooted aquatic vegetation, clear water, and substrates free of silt (Ohio Division of Wildlife 2018).	Low potential to occur within waterbodies within the Project.
Northern redbelly dace *Chrosomus eos*	ST	Occurs within slow-moving rivers and ponds with dense aquatic vegetation within the Big Sioux River drainage (Pasbrig 2014).	Low potential to occur within waterbodies within the Project.
Insects			
Dakota skipper *Hesperia dacotae*	FT	Occurs within two types of native prairie habitat, including moist bluestem prairie and dry upland prairies along ridges and hillsides (USFWS 2018b).	Low potential to occur within grassland habitats within the Project.
Poweshiek skipperling *Oarisma poweshiek*	FE	Occurs within high quality tallgrass prairie in both upland, dry areas as well as low, moist areas (USFWS 2014c).	Low potential to occur within grassland habitats within the Project.

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

A study of nine female NLEBs using an intensively managed forest in West Virginia found this species forages in areas with forest patch sizes between 114 and 161 ac (Owen et al. 2003). Abundance of NLEB prey items, particularly beetles and moths, are typically higher in more closed forest stands than in forest openings, which supports studies that have found NLEB tend to avoid open habitats (Owen et al. 2003). Based on current knowledge, it is unlikely that NLEBs would cross over large open lands (e.g., land lacking suitable habitat) to search for foraging and roosting habitats.

While NLEBs 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 found NLEBs may use woodlots and riparian zones with as few as 15 to 49 ac of forest cover (Foster and Kurta 1999, Henderson and Broders 2008).

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 et al. 1999).

During the summer, NLEBs roost singly, or in colonies, underneath bark, in cavities, or in crevices of both live and dead trees (USFWS 2014b). Cooler roost locations such as caves and mines may be used by non-reproductive females and males. In general, NLEBs are opportunistic in selecting roosts and using tree species that retain bark, provide cavities, or crevices. Rarely, NLEBs 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.

Potential Habitat within the Project Area

The USFWS's *Northern Long-eared Bat Interim Conference and Planning Guidance* (2014a) provides a home range estimate of 1.5 mi for NLEB and 2.5 mi for Indiana bats. In order to provide a conservative assessment of the potential foraging range and identify potential corridors of connected habitat in the vicinity of the Project, WEST's desktop assessment utilizes a 2.5-mi buffer around the Project boundary, referred to as the Assessment Area, in order to provide a conservative estimate of the potential foraging range of NLEB and to identify potential corridors of connected habitat in the vicinity of the Project

WEST derived potential NLEB summer habitat in the Assessment Area using a machine learning classification algorithm to delineate forest patches. The classifier was built using imagery from the Landsat 8 and Sentinel-2 satellites (USGS 2016a, European Space Agency 2017), as well as aerial imagery from the National Agriculture Imagery Program (USDA 2018) and used in a Random Forests model (Breiman 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.

WEST biologists determined the potential suitability of forested habitat within the Assessment Area for NLEB based on the USFWS's *Indiana Bat Section 7 and Section 10 Guidance for Wind*

Energy Projects (2011) and the *2018 Range-Wide Indiana Bat Summer Survey Guidelines* (2018f). According to the USFWS, both of these documents and the protocols therein can be used for NLEB presence/absence summer surveys (USFWS 2018g). For the purposes of this assessment, WEST categorized potentially suitable forest patches for NLEB within the Assessment Area into the following categories:

- Greater than 50 ac – Medium-large roost/foraging areas (larger areas of contiguous forests and/or riparian corridors).
- Between 15 and 50 ac – Small roost/foraging areas (smaller areas of forest comprised of woodlots and riparian corridors).
- Less than 15 ac – Commuting/travel corridors (typically include shelterbelts and small woodlots).

Although the NLEB is a forest-dependent species, the species will use open areas that are proximate to occupied habitat. Studies of Indiana and NLEB behavior using telemetry data on foraging activity have indicated that isolated trees or small forest patches might only be suitable as habitat when they are less than 1,000 ft from other forested/wooded habitats (USFWS 2014a, USFWS 2011). Therefore, a 1,000-ft connected habitat buffer was placed around forested patches to conservatively identify non-forested areas within the Assessment Area that could be utilized by NLEB moving between roosting and foraging areas.

Within the Assessment Area, wooded habitat is generally confined to small (less than 15 ac) woodlots and windbreak tree rows, with the majority of wooded areas consisting of scattered patches that would not be considered suitable summer habitat for NLEB (Figure 7). A total of seven forested patches were identified that are large enough to support NLEB (at least 15 ac), two of which include forested habitat within the Project boundary. The largest area of suitable habitat for NLEB (Habitat Area #1) is in the southwestern portion of the Assessment Area, and includes two small roost/foraging areas (between 15 and 50 ac) as well as several commuting/travel corridors. Habitat Area #1 extends into the southern portion of the Project boundary, where approximately 23 ac of forested patches could be used by NLEB for commuting/travel corridors.

Habitat Area #2 is located in the center of the Assessment Area (in the south-central portion of the Project), and includes one small roost/foraging area that consists of several connected windbreaks and small woodlots that could function as commuting/travel corridors. Habitat Area #2 is located within the Project boundary, where approximately 37 ac of forested patches could be used by NLEB. Because the portion of Habitat Area #2 that is large enough to support the NLEB (greater than 15 ac) includes windbreaks, rather than forested patches, and is otherwise unconnected to other areas of suitable habitat, it is unlikely that NLEB would utilize this area for roosting/foraging.

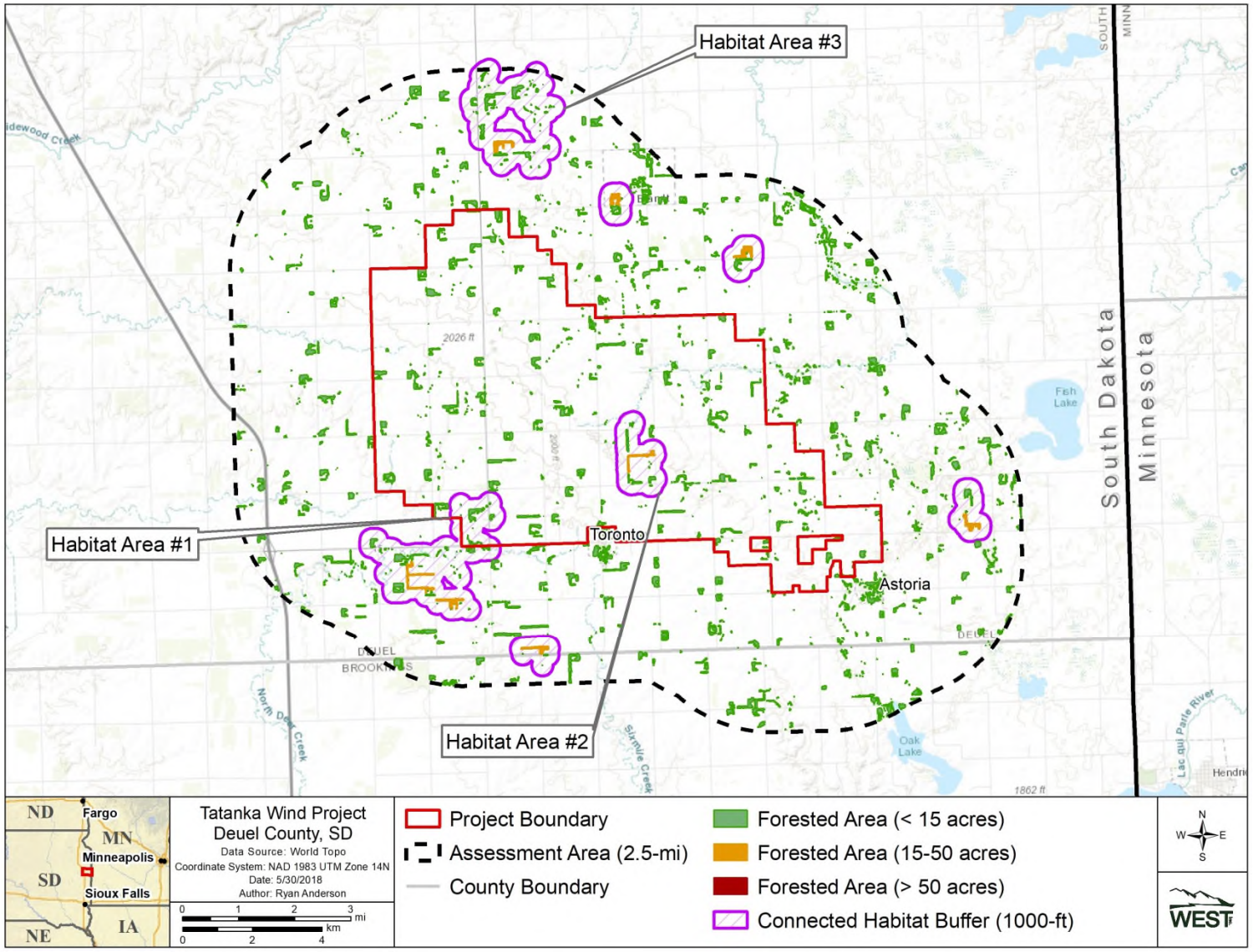


Figure 7. Potential northern long-eared bat habitat in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.

Habitat Area #3 is in the northern portion of the Assessment Area, and includes one small roost/foraging area and numerous commuting/travel corridors. Habitat Area #3 is not connected to any forest patches within the Project boundary; therefore, if NLEB occur in Habitat Area #3 during the summer, they would not be expected to travel into the Project.

The four other forested patches identified that are large enough to support NLEB each contain one small roost/foraging area and a small number of patches that could be utilized as commuting/travel corridors. Because none of these areas are connected to forest patches within the Project boundary, NLEBs occurring within these areas would not be expected to travel into the Project.

Due to the paucity of data available regarding the distance that NLEB will travel over open land, and based on the USFWS conclusion that Indiana bats are unlikely to occur within project areas more than 1,000 ft from wooded areas (USFWS 2011), WEST conservatively recommends that if turbines are proposed within 1,000 ft of potential summer habitat for NLEB within Habitat Area #1 or Habitat Area #2, that coordination with USFWS should occur to determine if presence/absence surveys may be warranted in those areas. Presence/absence surveys should follow Phase 2 survey recommendations found in the *Northern Long-eared Bat Interim Conference and Planning Guidance* (USFWS 2014a) and *2018 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS 2018g), and should occur in the recommended survey window, defined as May 15 through August 15.

5.1.3 Topeka Shiner

The Topeka shiner, an 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 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 (USFWS 2018h).

Critical habitat was designated for the Topeka shiner in 2004 (69 Federal Register 44736). Critical habitat has not been designated within the Project boundary; the closest designated critical habitat is in Lincoln County, Minnesota, approximately 18 mi southeast of the Project (Figure 8).

Within the Middle Big Sioux watershed, the Topeka shiner has been documented within 2.0 mi of the Project boundary in two waterbodies. The closest of these is 1.1 mi southwest of the Project, where the Topeka shiner was most recently documented in North Deer Creek in 2011. As depicted in Figure 8, North Deer Creek flows through the southwestern corner of the Project area downstream to where the species has been documented. The Topeka shiner was also documented in a tributary of Sixmile Creek 1.6 miles south of the Project in 1998; however, the tributary of Sixmile Creek is not directly connected to waterbodies within the Project boundary.

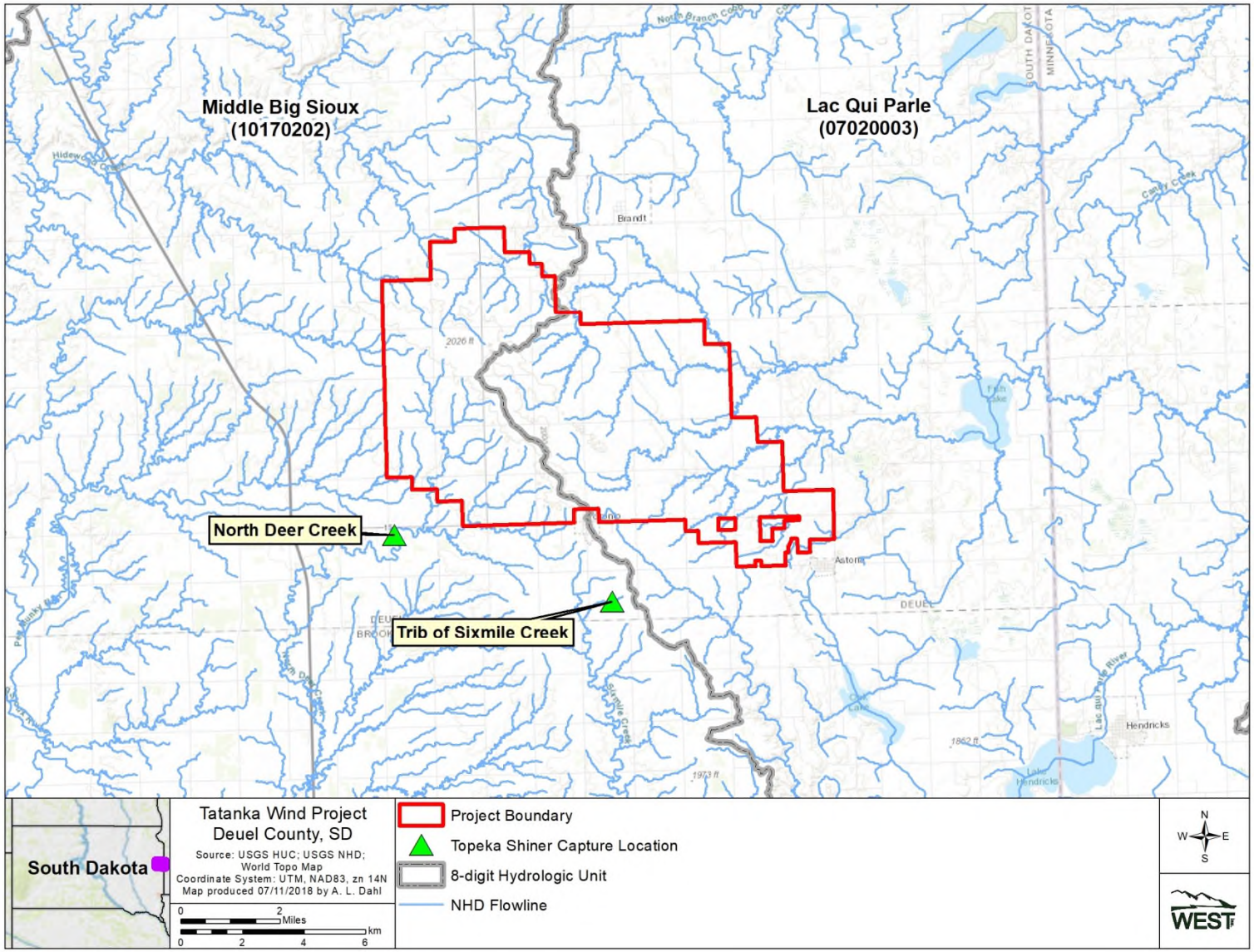


Figure 8. Documented occurrences of the Topeka shiner in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota (SDNHD 2018 [Appendix A]).

Due to the documented occurrence of Topeka shiners in North Deer Creek and the connectivity of this waterbody with the Project, WEST conservatively recommends that if in-stream activities are proposed within the portion of the Project in the Middle Big Sioux watershed (western portion of the Project; Figure 8), that coordination with USFWS should occur to determine if surveys are warranted and to develop avoidance and mitigation measures.

5.1.4 Dakota Skipper and Poweshiek Skipperling

The Dakota skipper (federally threatened) and Poweshiek skipperling (federally endangered) are small butterflies that occur within native prairie habitat. Critical habitat was designated for the Dakota skipper and Poweshiek skipperling in 2015 (80 Federal Register 59248–59384). South Dakota Unit 2 is the nearest designated critical habitat for the Dakota skipper and Poweshiek skipperling, which is approximately 3.0 mi south-southeast of the Project, adjacent to Oak Lake in Brookings County (Figure 9).

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 (USFWS 2018b). The Dakota skipper occurs within two general habitat types, described as Type A and Type B habitats by the USFWS (2018a). Type A habitats include low wet-mesic prairie with little topographic relief that occurs on near-shore glacial lake deposits (Royer et al. 2008). Type B habitats occur primarily on rolling terrain over gravelly glacial moraine deposits and are dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and needle or porcupine grasses (*Hesperostipa* spp.). In northeastern South Dakota, Dakota skippers inhabit primarily Type B habitats with abundant purple coneflower (*Echinacea purpurea*), but have also been observed in wet-mesic prairie that is dominated by big bluestem (USFWS 2018b).

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 (USFWS 2014c). The species was last observed in South Dakota in 2008 (79 Federal Register 63672–63748).

To identify native prairie habitat that could support the Dakota skipper or Poweshiek skipperling within the Project boundary, and as discussed in additional detail in Section 4.4, WEST biologists compared data from the SDSU system and lands identified by the USGS NLCD (2011, Homer et al. 2015) as herbaceous or hay/pasture with current aerial imagery (ESRI 2018). Additionally, WEST referred to areas of suitable habitat identified during 2015 field visits as characteristic of native prairie communities. The 2015 field visits focused on leased lands that were accessible within a previous project boundary; the 2015 assessment did not cover all of the grasslands in the current Project, but did identify several areas of potential native prairie communities (WEST 2015, unpublished data). Based on this review, potentially undisturbed grasslands that may provide suitable habitat for the Dakota skipper and/or Poweshiek skipperling comprise approximately 3,154 ac of land within the Project.

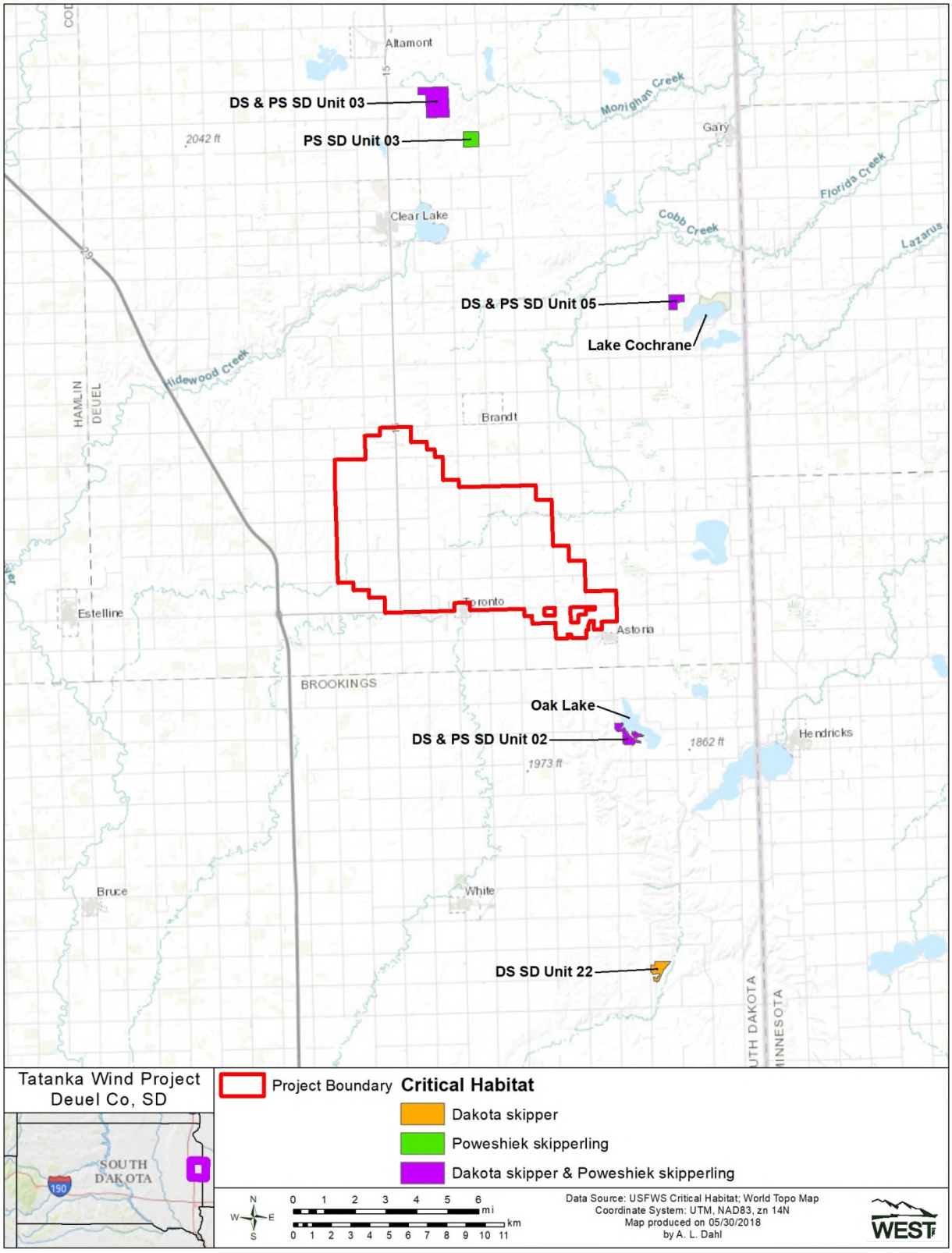


Figure 9. Federally designated critical habitat for the Dakota skipper and Poweshiek skipperling in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.

Flight surveys were conducted in two of the patches of suitable habitat during the peak flight period for these species in 2015 (HDR Engineering 2015; Figure 10); no flight surveys were conducted at the other patches that were confirmed to be suitable habitat in 2015 because potential impacts from Project construction were not anticipated at that time. No Dakota skippers or Poweshiek skipperlings were observed during the 2015 flight surveys; therefore, the species were determined to be absent at the two surveyed locations.

Due to the extent of potential native prairie identified within the Project boundary, WEST recommends that a field-based assessment occur within the 2018 field season to evaluate grassland condition and identify areas where high quality native prairie are present that are most likely to support the Dakota skipper and/or Poweshiek skipperling. If construction activities are proposed within native prairies, species-specific surveys should be conducted in accordance with the 2018 Dakota Skipper (*Hesperia dacotae*) North Dakota Survey Protocol (USFWS 2018a); if surveys indicate the presence of one or both of these butterfly species, coordination with USFWS should occur in order to develop avoidance and mitigation measures.

5.2 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).

To obtain information on state-listed species potentially present within or near the Project, WEST reviewed the state of South Dakota's list of threatened, endangered, and candidate species documented within Deuel County, which was last updated in 2016 (SDGFP 2016), and requested a SDNHP database review of rare plants, animals, and ecosystems documented in or near the Project. The SDNHP's response to this request, dated May 30, 2018, is provided in Appendix A.

Three state-listed endangered or threatened species have been documented within Deuel County, including the northern river otter, banded killifish, and northern redbelly dace (Table 4; SDGFP 2016); however, none of these species has been documented within or near the Project (Appendix A). Because the northern river otter occurs within large, slow-moving waterbodies where large fish are present (Kiesnow and Dieter 2005), which are not present within the Project boundary, the potential for the Project to impact this species is considered minimal. The banded killifish and northern redbelly dace both occur within a variety of aquatic habitats, including streams, ponds, and lakes (Ohio Division of Wildlife 2018, Pasbrig 2014). Although the potential for these species to occur within the Project is low, if in-stream activities are proposed, we recommend that coordination with SDNHP and SDGFP occur to determine the nearest documented occurrence of these species, whether surveys are warranted, and to develop avoidance and mitigation measures.

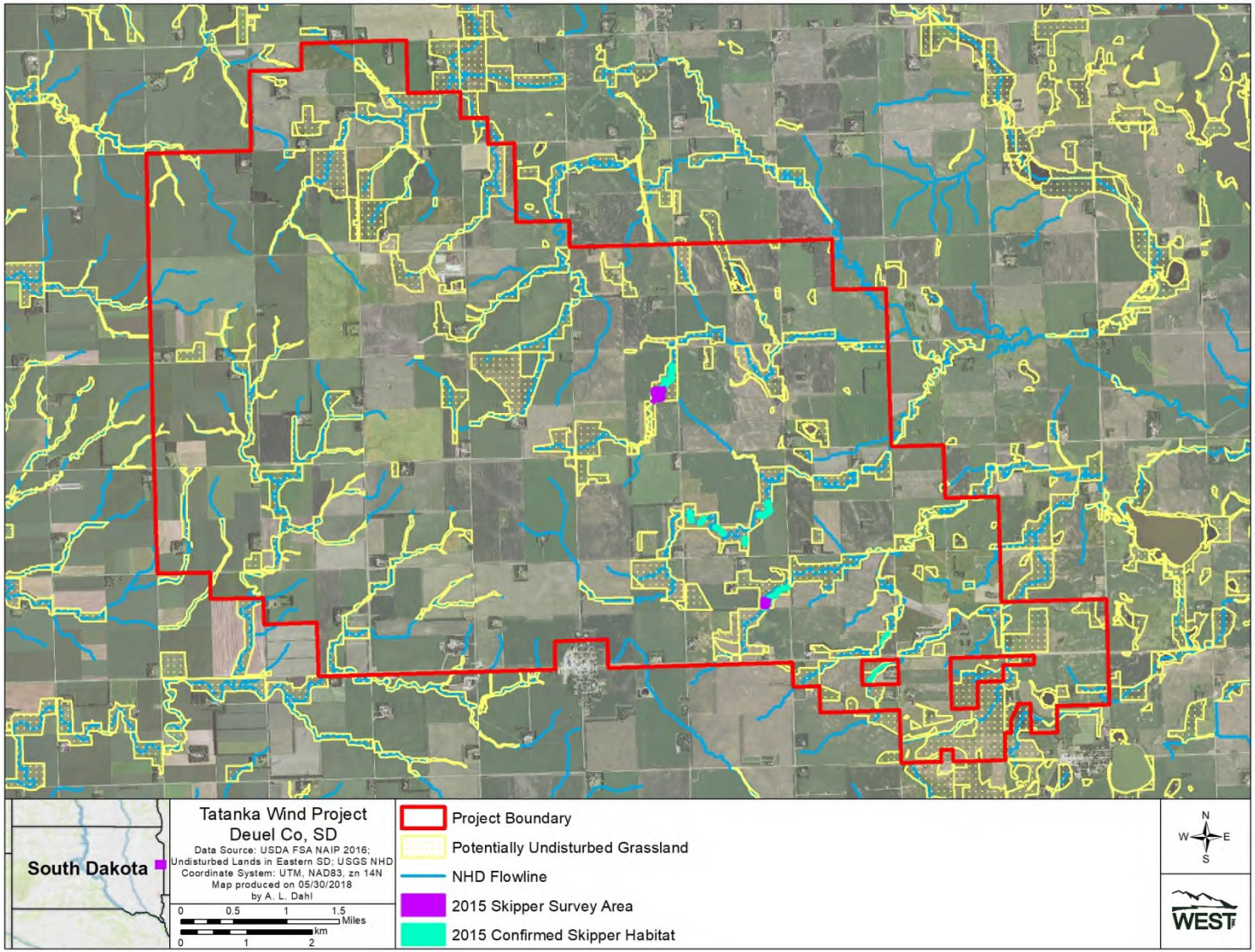


Figure 10. Potentially undisturbed lands and potentially suitable habitat for the Dakota skipper and Poweshiek skipperling identified during field surveys in 2015 within the Tatanka Wind Project, Deuel County, South Dakota.

5.3 Bald and Golden Eagles

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are afforded legal protection under authority of the Bald and Golden Eagle Protection Act (BGEPA;16 United States Code [USC] §§ 668–668d) and the Migratory Bird Treaty Act (MBTA; 16 USC §§ 703-712). In September 2009, the USFWS established rules (Eagle Rule; 50 Code of Federal Regulations (CFR) 22.26 and 22.27) authorizing limited legal take of Bald and Golden Eagles and their nests "when the take is associated with, but not the purpose of, an otherwise lawful activity, and cannot practicably be avoided." Such authorization is provided in the form of a take permit issued by the USFWS, consistent with specified regulatory criteria. On December 16, 2016, the USFWS issued a revised Eagle Rule that includes changes to the regulations for eagle incidental take permits and eagle nest take permits. The revisions to the Eagle Rule went into effect on January 17, 2017, and include changes to permit issuance criteria, duration (including a maximum permit term of 30 years), compensatory mitigation standards, and permit application requirements. To date, no eagle incidental take permits have been issued for wind projects under the new rule.

As discussed in the sections below, bald eagles have been observed occasionally in and near the Project, but there have only been a few sightings of golden eagles or near the Project in recent years.

5.3.1 Bald Eagle

Bald eagles prefer to use mature trees near permanent bodies of water (e.g., rivers or lakes) with an abundant prey source for their nesting, roosting, and foraging activities (Swenson et al. 1986, Mojica et al. 2008). As described in Sections 4.1 and 5.1.2, approximately 65% of land cover within the Project boundary is cultivated cropland, and less than 1% of the Project consists of forested habitat that is generally confined to small woodlots and windbreak tree rows. Furthermore, the majority of the land near the Project does not include large rivers or wetland systems that might provide substantial foraging opportunities for eagles. However, several lakes (e.g., Oak Lake, Fish Lake, and Lake Hendricks) east of the Project provide foraging and potential nesting habitat for bald eagles.

There have been both historic and recent sightings of bald eagles adjacent to or near the Project area. Based on eBird data, there were two bald eagle sightings 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).

Based on these known occurrences of bald eagles near the Project and the history of eagles in eastern South Dakota, bald eagles may use the Project for foraging activities during the winter, migration, and breeding/nesting seasons. However, it is likely that most bald eagle nesting and foraging activities are concentrated at the nearby lakes and rivers that are outside of the Project. Due to the potential for bald eagle use of the Project area, and as discussed in additional detail in Section 7, WEST recommends that additional Tier 3 studies per the WEG and Stage 2 studies per the ECPG be considered prior to development of a wind farm in the Project area.

5.3.2 Golden Eagle

Golden eagles commonly breed in the western United States (Kochert et al. 2002); 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). There has been one reported sighting of a golden eagle in or near the Project, which occurred in March 2017 adjacent to and north of the Project (eBird 2018). Golden eagle use within the Project is likely limited to rare occurrences during migration or the winter. However, due to the potential for golden eagle use of the Project area, and as discussed in additional detail in Section 7, WEST recommends that additional Tier 3 studies per the WEG and Stage 2 studies per the ECPG be considered prior to development of a wind farm in the Project area.

6 BIRD AND BAT OVERVIEW

The sections below provide a general overview of potential bird and bat habitat and use in or near the Project. These overviews are intended to characterize the types of birds and bats that may use or migrate through the Project and to identify any areas where these species may concentrate. Although development of the Project could have incidental impacts on these species or their habitats, project-specific recommendations relating to these species are not warranted at this time.

6.1 Birds

As discussed in the sections below, numerous bird species have been documented near the Project. The vast majority of these are migratory birds, which are protected by the MBTA. The 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 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, which withdraws and replaces M-37041 on the same topic issued near the end of the Obama administration. 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." (DOI 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." (USFWS 2018c) 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. Although the Project will not result in purposeful take of migratory birds, the following sections are intended to provide a robust analysis of potential bird use in the vicinity of the Project.

6.1.1 Migratory Birds

The Project is located within the Central Flyway, which is used by migrating waterfowl, waterbirds, shorebirds, songbirds, and raptors. Of these species groups, waterfowl has the greatest potential to migrate through the Project area. Waterfowl migration corridors that follow a broad front through eastern South Dakota are used by as many as three million dabbling ducks (USGS 2013). The WPAs and WMAs within and near the Project provide feeding and resting areas for waterfowl, waterbirds, and shorebirds migrating through this region.

6.1.2 USFWS Birds of Conservation Concern

The USFWS lists 27 species as Birds of Conservation Concern (BCC) within the Prairie Potholes Bird Conservation Region where the Project is located (USFWS 2008); the USFWS has determined that six of these species are of particular concern at the Project location (Table 5). The BCC species have been identified as vulnerable to population declines in the area by the USFWS (2002). A review of eBird data (2018) indicates that the BCC species identified by the USFWS have been sighted near the Project in recent years, but that sightings are infrequent and primarily occur east of the Project near Oak Lake.

Table 5. Birds of conservation concern identified by the USFWS as being of particular concern near the Tatanka Wind Project, Deuel County, South Dakota.

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

Source: USFWS IPaC Report in Appendix A

6.1.3 Important Bird Areas

The National Audubon Society (Audubon) has identified Important Bird Areas (IBAs) that provide essential habitat for a variety of bird species and are important for the conservation of bird populations (Audubon 2018a). These IBAs include sites for breeding, wintering, and/or migrating birds, and can range from a few acres to thousands of acres in size.

There are three recognized IBAs within approximately 15 mi of the Project, including Oakwood Lakes IBA and two portions of the Prairie Coteau Complex IBA (Figure 11). The Oakwood Lakes IBA is approximately 15 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 7 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).

6.1.4 USGS Breeding Bird Survey

The USGS North American Breeding Bird Survey (BBS) is a collaborative effort between the USGS Patuxent Wildlife Research Center and Environment Canada's Wildlife Service. The objective of the survey is to monitor the status and trends of North American bird populations via standardized protocol collected by participants along thousands of randomly established roadside routes throughout the continent.

The closest BBS route (Tyler) is approximately 25 mi east of the Project (Figure 11). 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 et al. 2018). The most common species were red-winged blackbird (*Agelaius phoeniceus*) and common grackle (*Quiscalus quiscula*). Bald eagles were infrequently seen along this route, with one bald eagle observed in 2014, 2016, and 2017, and none observed all other years that the route was surveyed. Five additional raptor species have also been observed along the route, including the American kestrel (*Falco sparverius)*, great horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), and turkey vulture (*Cathartes aura*). Each of the five BCC species identified in Table 5 that occur in the area during the breeding season have been documented along the Tyler BBS route. Of these, the bobolink has been documented most frequently, which was documented a total of 60 times between 1993 and 2016, although it was not observed along the Tyler BBS route during the 2017 survey (Pardieck et al. 2018).

6.1.5 Raptors

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 is generally confined to small woodlots and windbreak tree rows. Nesting in the agricultural and developed areas would be limited to manmade structures, such as power poles and other infrastructure.

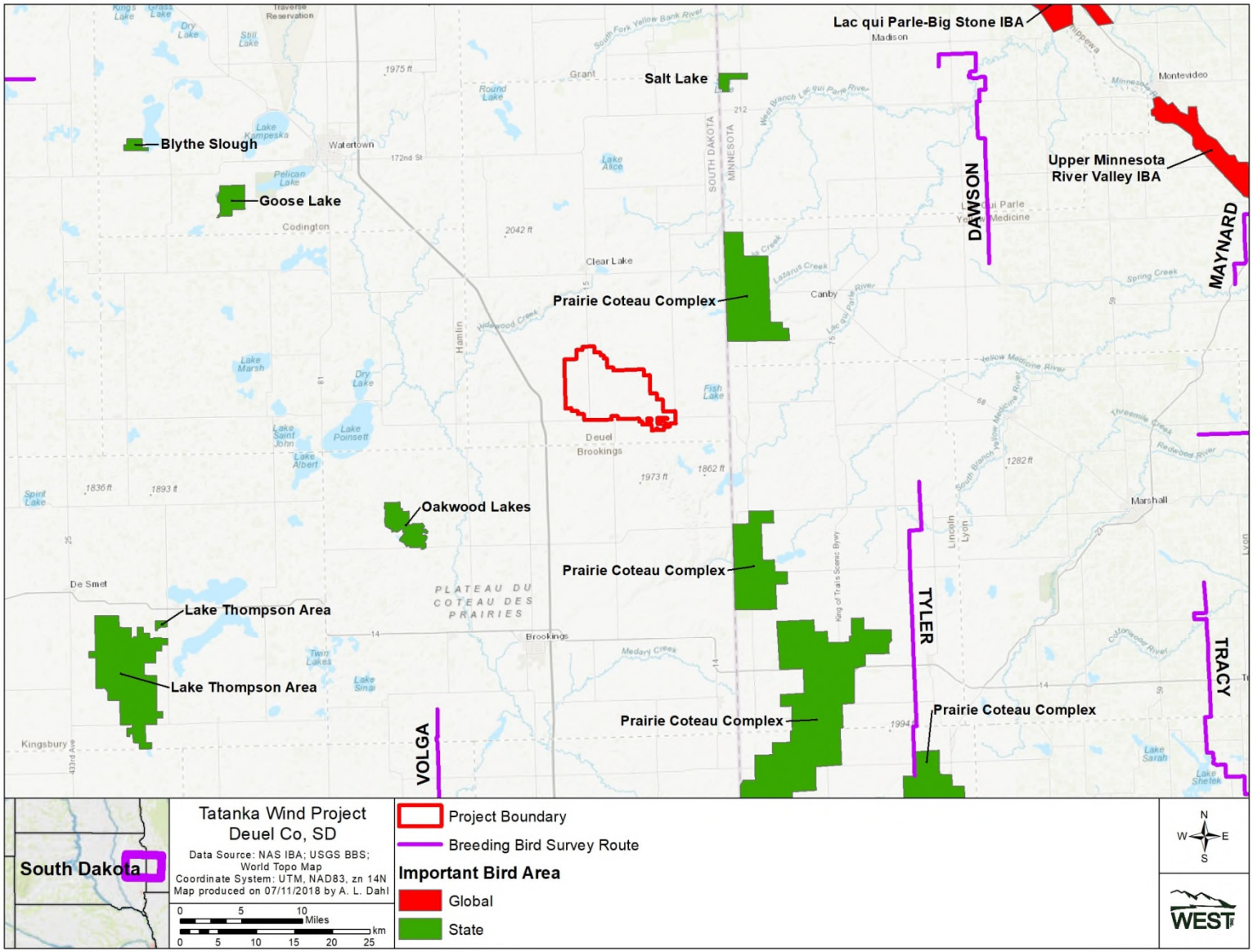


Figure 11. Important Bird Areas in the vicinity of the Tatanka Wind Project, Deuel County, South Dakota.

During migration, raptors could rest and forage in the Project, depending on habitats preferred by individual raptor species, weather, and prey availability. Several factors influence the migratory patterns of raptors, the most significant of which is geography (Liguori 2005). Two geographical features are primarily used by raptors during migration: ridgelines and shorelines of large bodies of water (Liguori 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 2005). It is for this reason that raptors tend to follow prominent ridges with defined edges during migration. The Project is situated in a flat to gently rolling landscape with no distinct ridges or other prominent topographical features, and therefore, raptor migration would be expected to occur in a broad front fashion with no areas of concentration or funneling in the Project.

6.2 Bats

Six bat species occur in eastern South Dakota (Harvey et al. 2011, Bat Conservation International 2018; Table 6). These species could potentially occur in the Project during all seasons except winter when they are hibernating or have migrated to warmer places. More detailed information on the NLEB is provided in Section 5.1.

Table 6. Bat species with potential to occur in or near the Tatanka Wind Project, Deuel County, South Dakota.

Common Name	Scientific Name
Big brown bat	*Eptesicus fuscus*
Eastern red bat	*Lasiurus borealis*
Hoary bat	*Lasiurus cinereus*
Little brown bat	*Myotis lucifugus*
Northern long-eared bat [1]	*Myotis septentrionalis*
Silver-haired bat	*Lasionycteris noctivagans*

[1] Federally listed as a threatened species

Based on 2011 USGS NLCD forestland cover types in the Project area, the Project has approximately 127.0 ac of woodland habitat for tree-roosting bats, with most of this habitat located in scattered woodlots throughout the Project area (Figure 7). The presence of wetlands, ponds, and cultivated cropland may also attract bats for foraging and drinking opportunities.

7 WEG TIER 2 AND ECPG STAGE 1 QUESTION RESPONSES

As described in the WEG (USFWS 2012), Tier 2 studies help to identify potential issues that may need to be addressed before further actions can be taken with the development or operation of a project. The following discussion provides answers to the WEG Tier 2 questions for the Project.

1. **Are known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?**

   The federally protected bald eagle is known to occur near the Project, particularly during migration and winter; however, based on documented sightings of bald eagles near the Project and the history of eagles in eastern South Dakota, it is likely that most bald eagle

nesting and foraging activities are concentrated at the nearby lakes that are outside of the Project to the east.

Federally listed as threatened, the NLEB could potentially occur within the Project boundary during spring and fall migration; however, preferred summer roosting and foraging habitat (i.e., forested areas) compose less than 1% of the Project, and therefore, NLEB occurrence within the Project boundary during the summer is likely to be limited. Critical habitat has not been designated for this species.

Federally listed as endangered, the Topeka shiner could potentially occur within the Project boundary. This species has been documented within North Deer Creek, which flows through the southwestern portion of the Project; the closest documented occurrence was approximately 1.1 mi southwest of the Project. The closest designated critical habitat for the Topeka shiner is approximately 18 mi southeast of the Project.

The Dakota skipper (federally listed as threatened) and Poweshiek skipperling (federally listed as endangered) could potentially occur within the Project boundary. Although these species have not been documented within the Project, potentially suitable habitat for these species may be present. Based on USGS NLCD data, approximately 28% of the land within the Project boundary includes herbaceous land and hay/pasture. Within these areas, potentially undisturbed grasslands (as mapped by SDSU) include approximately 3,154 ac of land. If high-quality native prairie habitat is present within these areas, it is possible that the Dakota skipper and/or Poweshiek skipperling may occur. The closest designated critical habitat (South Dakota Unit 2) for Dakota skipper and Poweshiek skipperling is approximately three mi south-southeast of the Project, adjacent to Oak Lake in Brookings County (Figure 9).

2. Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information?

One federally managed area is present within the Project boundary (Deuel County WPA 48), which is located in the eastern portion of the Project. The Project boundary also contains five privately owned parcels that have USFWS-protected wetland basins within them, and two privately owned parcels with USFWS grassland easements. While development is not completely precluded in these areas, impacts to protected wetland basins (within parcels with USFWS wetland easements) are not allowed, and any proposed impacts to grasslands within grassland easements would be subject to review and permit through the USFWS Wetland Management District. In addition, several WPAs and SCAs occur in the vicinity of the Project boundary, which have the potential to provide suitable habitat for migrating birds and other wildlife.

The closest IBA (Prairie Coteau Complex) is located approximately seven mi east of the Project.

3. **Are plant communities of concern present or likely to be present at the site?**

   The Project contains a total of 3,154 ac of potentially undisturbed grasslands, which may include native prairie communities. The Project also contains two privately owned parcels, totaling 102 acres, with USFWS grassland easements that preclude them from removal/cropping. However, federally and state-listed plants are not known to occur within Deuel County, and the Project does not contain any designated plant communities of concern.

4. **Are there known critical areas of wildlife congregation, including, but not limited to, maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?**

   No critical areas of wildlife congregation are known to occur within or near the Project boundary.

5. **Using best available scientific information, has the relevant federal, state, tribal, and/or local agency determined the potential presence of a population of a species of habitat fragmentation concern?**

   The Project area has been historically cleared for agricultural purposes and habitat is currently highly fragmented. Larger areas of herbaceous land are present within an area extending from the upper northcentral portion of the Project to the southeastern portion of the Project. However, the majority of these grassland areas are expected to be of relatively low quality based on cattle grazing observed during the site visit, existing fragmentation associated with agricultural land use, and because they have not been identified as potentially undisturbed lands. Therefore, it is unlikely that there is a population of a species of habitat fragmentation concern in the Project area.

6. **Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?**

   Bald eagles and other raptors have been observed adjacent to and near the Project area. The USFWS has identified six BCC of particular concern at the Project location (Table 5).

   Six bat species have the potential to occur within the Project boundary (Table 6), including the federally threatened NLEB. However, as described above, because forest habitat in the Project area is highly fragmented, and includes less than 1% of the Project, it is expected that bat use of the Project area is low during the summer months. Although numerous waterbodies are present, because the Project does not appear to contain high quality habitat for bats, it is expected that migrating bats would be more likely to occur within higher quality habitat east of the Project.

7. **Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above, and considering the design of the proposed project?**

   In general, the Project poses a relatively low risk to species of concern due to scarcity of these species and limited suitable habitat in the Project area. The Project could pose a slightly higher risk of impacts to Dakota skipper and/or Poweshiek skipperling if native prairie habitat is present within the Project boundary and direct impacts to those habitats is proposed. Additional information gathered as part of Tier 3 studies at the Project would help to further answer this question.

The ECPG (USFWS 2013a) suggest specific questions that should be considered to facilitate placing a prospective project site into an appropriate risk category. These questions are answered below based on the information compiled during this review, which constitutes a Stage 1 initial site assessment.

1. **Does existing or historical information indicate that eagles or eagle habitat may be present within the geographic region under development consideration?**

   Bald eagles have been observed adjacent to and near the Project area, and suitable eagle habitat (i.e., wooded riparian habitat along lakes and rivers) is located east of the Project boundary, although it is relatively limited.

2. **Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the project?**

   Land use within the Project area is predominantly cultivated farmland and developed land (70% of the Project area), which provides limited foraging or nesting habitat. There are only 127 ac (less than 1% of the Project area) of forest within the Project boundary; most of the forests consist of small woodlots at farmsteads scattered throughout the area. There are several larger waterbodies (e.g., Oak Lake, Fish Lake, and Lake Hendricks) east of the Project that provide suitable foraging and nesting habitat for bald eagles.

3. **Are there important eagle use areas or migration concentration sites documented or thought to occur in the project area?**

   There are no known important eagle use areas or migration concentration sites in the Project, based on the assessments done to date. The waterbodies east of the Project boundary have more potential for eagle use. Additional information gathered as part of Tier 3 eagle use studies at the Project would help to further answer this question.

4. **Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration?**

   Abundant prey for eagles is not expected to be present within the Project area. Some foraging opportunities may be present in the form of carrion and small game within grasslands, or livestock carcasses associated with agricultural operations.

5. **For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?**

   The potential for significant adverse impacts to bald eagles from construction and operation of the Project appears to be relatively low. Although there have been some publicly reported bald eagle observations adjacent to and near the Project area, the overall quality of eagle habitat and potential for eagle use in the Project area is low due to extensive cropland, and a lack of foraging areas and nesting substrate. Additional information gathered as part of Tier 3 eagle use studies at the Project would help to further answer this question.

Based on the findings in this SCS report, it is recommended that additional Tier 3 studies per the WEG and Stage 2 studies per the ECPG be considered prior to development of a wind farm in this Project area. Additional studies may include: 1) eagle and other large bird use surveys, 2) raptor nest surveys, and 3) acoustic bat surveys. State and federal agencies (i.e., SDGFP and USFWS) should be consulted regarding these surveys as well as the proposed Project.

8 REFERENCES

33 US Code (U.S.C.) § 404. 1972. Clean Water Act, Section 404. 33 U.S.C. §§ 1251-1387. Pub. L. 92-500, Oct. 18, 1972. 86 Stat. 816-903.

50 Code of Federal Regulations (CFR) § 22.26. 2013. Title 50 - Wildlife and Fisheries; Chapter I - United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits; Subpart C - Eagle Permits; Section (§) 22.26 - Permits for Eagle Take That Is Associated with, but Not the Purpose of, an Activity. 50 CFR 22.26. [74 FR 46877, September 11, 2009, as amended at 79 FR 73725, December 9, 2013].

50 Code of Federal Regulations (CFR) § 22.27. 2009. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits; Subpart C - Eagle Permits; Section (§) 22.27 - Removal of Eagle Nests. 50 CFR 22.27. [74 Federal Register (FR) 46877, September 11, 2009].

50 Code of Federal Regulations (CFR) Part 17. 2004. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 17 - Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Topeka Shiner. 50 CFR Part 17. [69 Federal Register (FR) 44736, July 27, 2004].

50 Code of Federal Regulations (CFR) Part 17. 2014. Endangered and Threatened Wildlife and Plants;Threatened Species Status for Dakota Skipper and Endangered Species Status for Poweshiek Skipperling; Final Rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17. 79 Federal Register (FR) 206: 63672-63748. October 24, 2014. Available online at: http://www.fws.gov/midwest/endangered/insects/dask/pdf/FRButterflyFinalListing24Oct2014.pdf

80 Federal Register (FR) 190: 59248-59384. 2015. 50 CFR 17. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Dakota Skipper and Poweshiek Skipperling. Final rule. Department of the Interior Fish and Wildlife Service. 80 FR 59248. October 1, 2015. Available online at: https://www.fws.gov/midwest/endangered/insects/dask/pdf/FRFinalCH1Oct2015.pdf

81 Federal Register (FR) 9: 1900-1922. 2016. Endangered and Threatened Wildlife and Plants; 4(D) Rule for the Northern Long-Eared Bat; Final Rule. 50 CFR 17. Department of the Interior, Fish and Wildlife Service. 81 FR 1900. January 14, 2016. Available online: http://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf

Audubon. 2018a. Important Bird Areas. Available online: https://www.audubon.org/important-bird-areas

Audubon. 2018b. Important Bird Areas – Oakwood Lakes South Dakota. Available online: https://www.audubon.org/important-bird-areas/oakwood-lakes

Audubon. 2018c. Important Bird Areas – Prairie Coteau Minnesota. Available online: https://www.audubon.org/important-bird-areas/prairie-coteau

Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code (USC) § 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, Section (§) 2, 54 Statute (Stat.) 251; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. As amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.

Bat Conservation International (BCI). 2018. Bat Species: US Bats. BCI, Inc., Austin, Texas. Accessed May 2018. Homepage: http://www.batcon.org; Species profiles available online: http://www.batcon.org/resources/media-education/species-profiles.

Bauman, P., B. Carlson, and T. Butler. 2016. Quantifying Undisturbed (Native) Lands in Eastern South Dakota: 2013. Available online: https://openprairie.sdstate.edu/cgi/viewcontent.cgi?article=1000&context=data_land-easternSD

Birds of North America (P. Rodewald, Ed.). 2018. Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North America: https://birdsna.org; May 2018.

Breiman, L. 2001. Random Forests. Machine learning 45(1): 5-32.

Bryce, S., J. M. Omernik, D. E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S. H. Azevedo. 1998. Ecoregions of North Dakota and South Dakota. Jamestown, ND: Northern Prairie Wildlife Research Center (Version 30NOV1998). Available online: http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/index.htm

eBird. 2018. eBird: An Online Database of Bird Distribution and Abundance. eBird, Cornell Lab of Ornithology, Ithaca, New York. Accessed May 2018. Available online: http://ebird.org/content/ebird/

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. Available online: https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4530

ESRI. 2018. World Imagery and Aerial Photos. ArcGIS Resource Center. ESRI, producers of ArcGIS software. Redlands, California. Information available online from: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

Foster, R. W. and A. Kurta. 1999. Roosting Ecology of the Northern Bat (Myotis septentrionalis) and Comparisons with the Endangered Indiana Bat (Myotis sodalis). Journal of Mammalogy 80(2): 659-672.

Grindal, S. D., J. L. Morissette, and R. M. Brigham. 1999. Concentration of Bat Activity in Riparian Habitats over an Elevational Gradient. Canadian Journal of Zoology 77(6): 972-977. doi: 10.1139/z99-062.

HDR Engineering Inc. 2015. 2015 Dakota Skipper (Hesperia Dacotae) and Poweshiek Skipperling (Oarisma Poweshiek) Survey Report. Perpared for Buffalo Ridge III, LLC. Portland, Oregon. Prepared by HDR Engineering, Inc. Des, Moines, Iowa. December 30, 2015.

Handley, L. and C. Wells. 2009. Comparison of NLCD with NWI Classifications of Baldwin and Mobile Counties, Alabama. U.S. Geological Survey Open-File Report 2009-1058. 11 pp. Available online: http://www.mobilebaynep.com/images/uploads/library/Comparison-of-NLCD-with-NWI-Classifications-of-Baldwin-and-Mobile-Counties-AL.pdf

Harvey, M. J., J. S. Altenbach, and T. L. Best. 2011. Bats of the United States and Canada. The Johns Hopkins University Press, Baltimore, Maryland.

Henderson, L. E. and H. G. Broders. 2008. Movements and Resource Selection of the Northern Long-Eared Myotis (*Myotis septentrionalis*) in a Forest-Agriculture Landscape. Journal of Mammalogy 89: 952-963.

Homer, C. G., J. A. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. D. Herold, J. D. Wickham, and K. Megown. 2015. Completion of the 2011 National Land Cover Database for the Conterminous United States-Representing a Decade of Land Cover Change Information. Photogrammetric Engineering and Remote Sensing 81(5): 345-354. Available online: http://www.mrlc.gov/nlcd2011.php

Johnson, R. R. and K. F. Higgins. 1997. Wetland Resources of Eastern South Dakota. Brookings: South Dakota State University. 102 pp. Available online: https://www.fws.gov/wetlands/Documents/Wetland-Resources-of-Eastern-South-Dakota.pdf

Kiesnow, A. M. and C. D. Dieter. 2005. Availability of Suitable Habitat for Northern River Otters in South Dakota. Great Plains Research: A Journal of Natural and Social Sciences 740. Available online: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1738&context=greatplainsresearch

Kochert, M. N., K. Steenhof, C. L. Mcintyre, and E. H. Craig. 2002. Golden Eagle (Aquila chrysaetos). A. Poole, ed. The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York. Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/684; doi: 10.2173/bna.684

Lausen, C. 2009. Status of the Northern Myotis (*Myotis septentrionalis*) in Alberta. Alberta Wildlife Status Report No. 3: (Update 2009).

Liguori, J. 2005. Hawks from Every Angle: How to Identify Raptors in Flight. Princeton University Press, Princeton, New Jersey.

Migratory Bird Treaty Act (MBTA). 1918. 16 United States Code (USC) §§ 703-712. July 13, 1918.

Mojica, E. K., J. M. Meyers, B. A. Millsap, and K. L. Haley. 2008. Migration of Florida Sub-Adult Bald Eagles. Wilson Journal of Ornithology 120(2): 304-310.

National Oceanic and Atmospheric Administration, National Weather Service. 2018. Observed Weather Reports – Monthly Weather Summary, Aberdeen, South Dakota, March through May 2018. Available online: http://w2.weather.gov/climate/index.php?wfo=abr

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Ohio Division of Wildlife. 2018. Western Banded Killifish – *Fundulus diaphanus menona*. Available online: http://wildlife.ohiodnr.gov/species-and-habitats/species-guide-index/fish/western-banded-killifish

Owen, S. F., M. A. Menzel, W. M. Ford, B. R. Chapman, K. V. Miller, J. W. Edwards, and P. B. Wood. 2003. Home-Range Size and Habitat Used by the Northern Myotis (*Myotis septentrionalis*). American Midland Naturalist 150(2): 352-359.

Pardieck, K. L., D. J. Ziolkowski, Jr., M. Lutmerding, and M. A. R. Hudson. 2018. North American Breeding Bird Survey Dataset 1966 - 2017, Version 2017.0. US Geological Survey, Patuxent Wildlife Research Center. Available online: www.pwrc.usgs.gov/BBS/RawData/

Pasbrig, C. 2014. The Glacial Relict Fishes of South Dakota's Sandhills. American Currents 39(1):29-30.

Royer, R. A., R. A. McKenney, and W. E. Newton. 2008. A Characterization of Non-Biotic Environmental Features of Prairies Hosting the Dakota Skipper (Hesperia Dacotae) across Its Remaining US Range. Journal of the Lepidopterists Society 62: 1-17.

South Dakota Game, Fish and Parks (SDGFP). 2003. Topeka Shiner (Notropis Topeka) Management Plan for the State of South Dakota. Wildlife Division Report No. 2003-10. SDGFP, Pierre, South Dakota. Summer 2003. 82 pp. Available online at: http://gfp.sd.gov/wildlife/critters/fish/rare-fish/docs/TopekaShinerManagementPlan-Revised.pdf

South Dakota Game, Fish, and Parks (SDGFP). 2016. State and Federally Listed Threatened, Endangered, and Candidate Species Documented in South Dakota by County. Updated on July 19, 2016. Available online: https://gfp.sd.gov/userdocs/docs/ThreatenedCountyList.pdf

Swenson, J. E., K. L. Alt, and R. L. Eng. 1986. Ecology of Bald Eagles in the Greater Yellowstone Ecosystem. Wildlife Mongraphs 94: 3-46.

US Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0). Engineer Research and Development Center ERDC/EL TR-10-16. August 2010. Available online: http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp/erdc-el-tr-10-16.pdf

US Department of Agriculture (USDA). 2015. Imagery Programs - National Agriculture Imagery Program (NAIP). USDA - Farm Service Agency (FSA). Aerial Photography Field Office (APFO), Salt Lake City, Utah. Data accessed September 2015. Available online: http://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

US Department of Agriculture (USDA). 2018. Imagery Programs - National Agriculture Imagery Program (NAIP). USDA, Farm Service Agency (FSA), Aerial Photography Field Office (APFO), Salt Lake City, Utah. Accessed January 2018. Information online: https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

US Department of the Interior (DOI). 2017. Memorandum: The Migratory Bird Treaty Act Does Not Prohibit Incidental Take. Office of the Solicitor, Washington, D.C. 41 pp. Available online: https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf

US Environmental Protection Agency (USEPA). 2016. Level III and Level IV Ecoregions of the Continental United States. Available online: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states

US Fish and Wildlife Service (USFWS). 2002. Birds of Conservation Concern 2002. USFWS Division of Migratory Bird Management December 2002. Arlington, Virginia.

US Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. December 2008. Division of Migratory Bird Management. Arlington, Virginia. Available online: https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

US Fish and Wildlife Service (USFWS). 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (Revised: 26 October 2011). Available online: http://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbaS7and10WindGuidanceFinal26Oct2011.pdf

US Fish and Wildlife Service (USFWS). 2012. Land-based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

US Fish and Wildlife Service (USFWS). 2013a. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

US Fish and Wildlife Service (USFWS). 2013b. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Eastern Small-Footed Bat and the Northern Long-Eared Bat as Endangered or Threatened Species; Listing the Northern Long-Eared Bat as an Endangered Species. Docket No. FWS-R5-ES-2011-0024. 78 Federal Register (FR) 191: 61046-61080. October 2, 2013.

US Fish and Wildlife Service (USFWS). 2013c. Northern Long-Eared Bat (*Myotis septentrionalis*). USFWS Environmental Conservation Online System (ECOS) Species Profile. Updated November 11, 2013. ECOS available at: http://ecos.fws.gov/ecos/indexPublic.do; Northern long-eared bat species profile available online: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0JE

US Fish and Wildlife Service (USFWS). 2013d. Rufa Red Knot, Calidris Canutus Rufa. Fact Sheet. September 2013. Available online at: https://www.fws.gov/northeast/redknot/pdf/Redknot_BWfactsheet092013.pdf

US Fish and Wildlife Service (USFWS). 2014a. Northern Long-Eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5, and 6. January 6, 2014. Available online: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

US Fish and Wildlife Service (USFWS). 2014b. Northern Long-Eared Bat: Range Maps. Midwest Region, Endangered Species, USFWS. Available online: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

US Fish and Wildlife Service (USFWS). 2014c. Poweshiek Skipperling (*Oarisma poweshiek*) Fact Sheet. Available online: https://www.fws.gov/midwest/endangered/insects/posk/PoweshiekSkipperlingFactSheet.html

US Fish and Wildlife Service (USFWS). 2015. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat with 4(D) Rule; Final Rule and Interim Rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17. 80 Federal Register (FR) 63: 17974-18033. April 2, 2015.

US Fish and Wildlife Service (USFWS). 2017. Critical Habitat Portal. USFWS Critical Habitat for Threatened and Endangered Species: Online Mapper. Accessed September 20, 2017. Information online: https://ecos.fws.gov/ecp/report/table/critical-habitat.html

US Fish and Wildlife Service (USFWS). 2018a. 2018 Dakota Skipper (*Hesperia dacotae*) North Dakota Survey Protocol. US Fish and Wildlife Service, North Dakota Field Office. Available online: https://www.fws.gov/mountain-prairie/es/protocols/2018_FINAL%20Dakota%20Skipper%20Survey%20Protocol_4202018.pdf

US Fish and Wildlife Service (USFWS). 2018b. Dakota Skipper (*Hesperia dacotae*) Fact Sheet. Last updated March 12, 2018. Available online: https://www.fws.gov/midwest/endangered/insects/dask/daskFactSheet.html

US Fish and Wildlife Service (USFWS). 2018c. Guidance on the Recent M-Opinion Affecting the Migratory Bird Treaty Act. April 11, 2018.

US Fish and Wildlife Service (USFWS). 2018d. Listed Species Believed to or Known to Occur in Each State. USFWS Endangered Species Program homepage: http://www.fws.gov/endangered/; Environmental Conservation Online System (ECOS): http://ecos.fws.gov/ecos/indexPublic.do; Threatened and Endangered Species System (TESS) listings by state: http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrence.jsp; Individual species profiles and status information available from the ECOS webpage.

US Fish and Wildlife Service (USFWS). 2018e. Northern Long-eared Bat Range Map. Available online: https://www.fws.gov/midwest/Endangered/mammals/nleb/nlebRangeMap.html

US Fish and Wildlife Service (USFWS). 2018f. Northern Long-eared Bat Final 4(d) Rule – White-Nose Syndrome Arend WNS/Pd Positive Counties/Districts. Last updated May 31, 2018. Available online: https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf

US Fish and Wildlife Service (USFWS). 2018g. Range-Wide Indiana Bat Summer Survey Guidelines (April 2018). USFWS Endangered Species Program: Midwest Region. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf

US Fish and Wildlife Service. 2018h. Topeka Shiner (*Notropis topeka*). Available online: https://www.fws.gov/midwest/endangered/fishes/topekashiner/index.html

US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI). 2014. NWI Data Mapper. Updated May 1, 2014. Fort Snelling, Minnesota. Wetlands Mapper: http://www.fws.gov/wetlands/Data/Mapper.html

US Geological Survey (USGS). 2013. Migration of Birds: Routes of Migration. Northern Prairie Wildlife Research Center, Jamestown, North Dakota. Accessed February 2015. Available online: http://www.sandiegocounty.gov/content/dam/sdc/pds/ceqa/Soitec-Documents/Final-EIR-Files/references/rtcref/ch2.3/2014-12-19_USGS2013_MigrationofBirds.pdf

US Geological Survey (USGS). 2016a. Landsat collections. Available online: https://landsat.usgs.gov/landsat-collections

US Geological Survey (USGS). 2016b. National Elevation Dataset (NED). Raster digital data. USGS, Sioux Falls, South Dakota. Accessed October 2016. Information online: http://nationalmap.gov

US Geological Survey (USGS). 2016c. National Hydrography Dataset (NHD). USGS NHD Extracts: North Dakota. Last accessed February 2016. Information available online at: http://nhd.usgs.gov/; State data available online at: ftp://nhdftp.usgs.gov/DataSets/Staged/States/FileGDB/HighResolution/

US Geological Survey (USGS). 2017. USGS Topographic Maps. Last updated January 17, 2017. Homepage available at: https://nationalmap.gov/ustopo/index.html

US Geological Survey (USGS) Gap Analysis Program (GAP). 2016. Protected Areas Database of the United States (PAD-US). Version 1.4 Combined Feature Class. May 2016. Available online at: http://gapanalysis.usgs.gov/padus/data/download/

US Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (NLCD 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Available online at: http://www.mrlc.gov/nlcd2011.php; Legend at: http://www.mrlc.gov/nlcd11_leg.php

Appendix B. Site Photographs

Photo 1. Grasslands present within southeastern portion of Project.

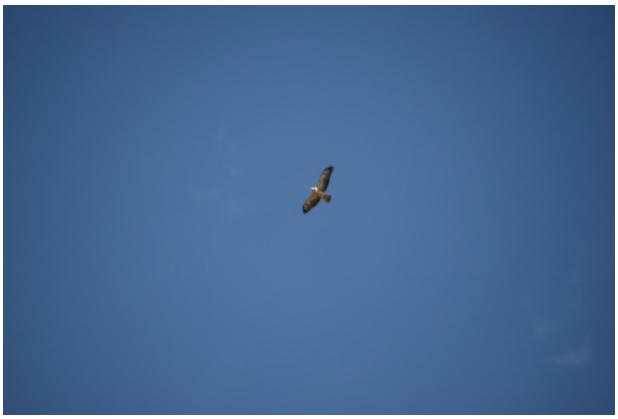


Photo 2. Photo facing east from County Road 311 / 483rd Avenue in the southeastern portion of the Project

Photo 3. Photo facing north from South Dakota Highway 28 in the southeastern portion of the Project.

Photo 4. Photo facing south from South Dakota Highway 28 in the southeastern portion of the Project.

Photo 5. Photo facing south from South Dakota Highway 28 in the south-central portion of the Project.

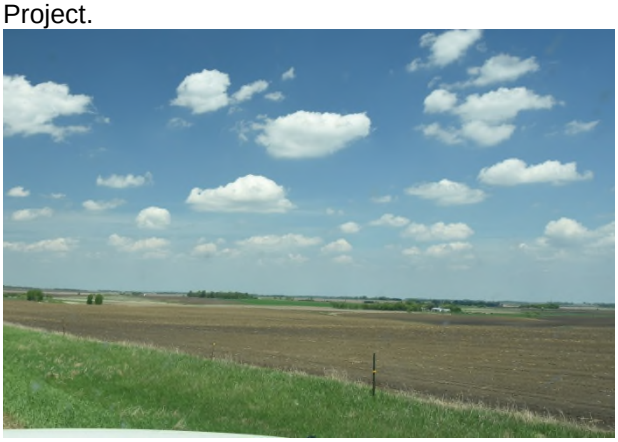


Photo 6. Agricultural field facing north on 192nd Street in the northeastern portion of the Project.

Photo 7. Field and ditch facing south on 191st Street in the central portion of the Project.

Photo 8. Forested patch facing east on 480th Avenue in the northeastern portion of the Project.

Photo 9. Pheasants Forever sign observed facing north on 192nd Street in the central portion of the Project.

Photo 10. Grassland observed facing north on 192nd Street in the central portion of the Project.

Photo 11. Grassland observed facing west on 178th Avenue in the northcentral portion of the Project.

Photo 11. Grassland observed facing south on 190th Street in the northcentral portion of the Project.

Appendix A. Agency Environmental Review Reports

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Deuel County, South Dakota

Local office

South Dakota Ecological Services Field Office

(605) 224-8693
(605) 224-9974

420 South Garfield Avenue, Suite 400
Pierre, SD 57501-5408

http://www.fws.gov/southdakotafieldoffice/

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Red Knot Calidris canutus rufa No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1864	Threatened

Fishes

NAME	STATUS
Topeka Shiner Notropis topeka (=tristis) There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4122	Endangered

Insects

NAME	STATUS
Dakota Skipper Hesperia dacotae There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened
Poweshiek Skipperling Oarisma poweshiek There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/9161	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

NOT FOR CONSULTATION

- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

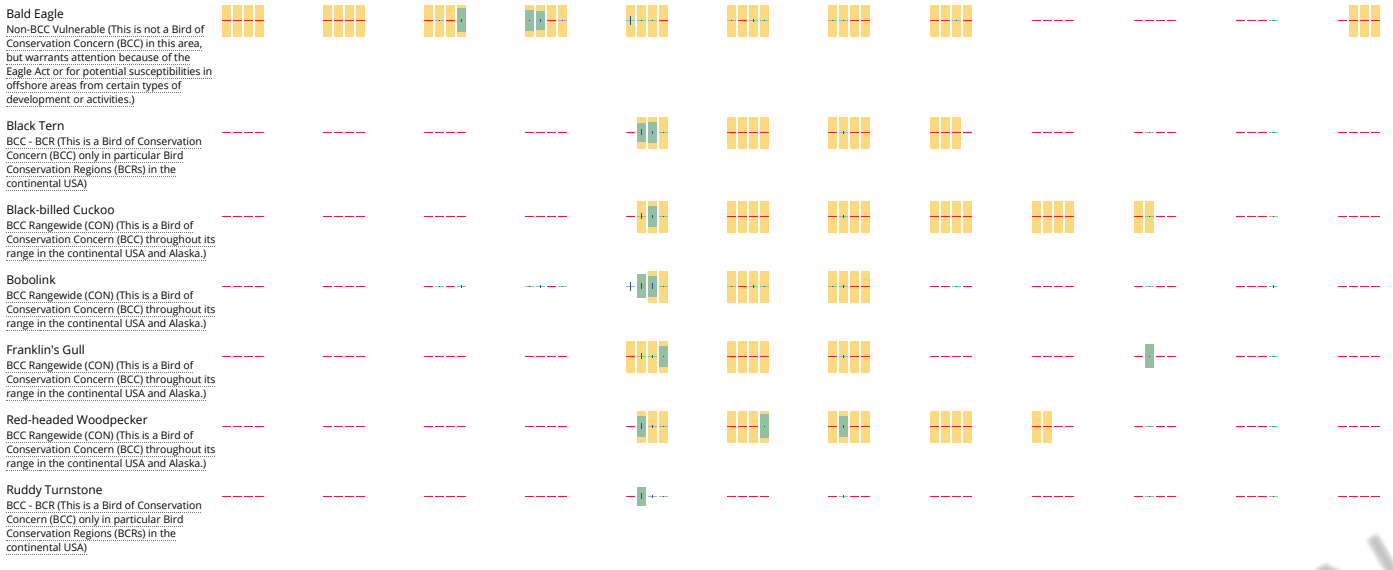
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
Madison Wetland Management District	130.81 acres

(605) 256-2974
(605) 256-9432

MAILING ADDRESS
P.O. Box 48
Madison, SD 57042-0048

PHYSICAL ADDRESS
23520 Sd Highway 19
Madison, SD 57042-0048

https://www.fws.gov/refuges/profiles/index.cfm?id=64560

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND
- PEM1/ABFd
- PEM1C
- PEM1Cd
- PEM1/ABF
- PEM1A
- PEM1Ad
- PEM1Cx
- PEM1/SSCd
- PEM1Fd
- PEM1/ABFh
- PEM1/FOCd
- PEM1/FOC

FRESHWATER FORESTED/SHRUB WETLAND
- PFOC
- PFOCd
- PSSCd
- PFOA
- PSSAd
- PFOCx
- PSSA

FRESHWATER POND
- PABFx
- PABFh

LAKE
- L2ABG

RIVERINE
- R4SBC
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

NOT FOR CONSULTATION

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Janelle Rieland <jrieland@west-inc.com>

RE: Natural Heritage Program Data Request

1 message

Heimerl, Casey <Casey.Heimerl@state.sd.us> Wed, May 30, 2018 at 11:27 AM
To: Janelle Rieland <jrieland@west-inc.com>

Hi Janelle,

Attached is a shapefile of records from the Natural Heritage Database that occurred within the project area you provided. Please note that many places in South Dakota have not been surveyed for rare or protected species and the absence of any additional records from the database does not preclude their presence in your project area.

Also attached is an invoice for the request and a description of the attribute fields in the shapefile.

If you have any questions please feel free to contact me.

~Casey

From: Janelle Rieland [mailto:jrieland@west-inc.com]
Sent: Wednesday, May 30, 2018 11:03 AM
To: Heimerl, Casey
Subject: Re: [EXT] Natural Heritage Program Data Request

Hi Casey,

Attached, please find the signed data use agreement. Thanks for your help!

On Wed, May 30, 2018 at 10:38 AM Heimerl, Casey <Casey.Heimerl@state.sd.us> wrote:

> Hi Janelle,
>
> There will be a couple records returned from this search. Could you please sign and email me back the attached data use agreement?
>
> Thanks,
>
> ~Casey
>
> **From:** Janelle Rieland [mailto:jrieland@west-inc.com]
> **Sent:** Tuesday, May 29, 2018 9:41 AM
> **To:** Heimerl, Casey
> **Subject:** Re: [EXT] Natural Heritage Program Data Request
>
> Good morning Casey,
>
> Thank you for getting back to me! Attached, please find the shapefile of the project area of interest.
>
> Have a wonderful morning,
>
> On Tue, May 29, 2018 at 9:34 AM Heimerl, Casey <Casey.Heimerl@state.sd.us> wrote:
>
> > Hi Janelle,
> >
> > I received your request for SD Natural Heritage data. Please provide me with a map or a shapefile (preferably) for your requested search area. I also want to make sure you are aware of the fees associated with data requests. Fees include $30 per hour of staff time required and $30 per database search. Once I receive your project area I can provide you with a cost estimate before I proceed if necessary. If the search results in any records, I will also require you to sign a data use agreement.
> >
> > Thanks!
> >
> > ~Casey
> >
> > **Casey Heimerl** | *Wildlife Biologist*
> >
> > South Dakota Game, Fish and Parks
> >
> > 523 East Capitol Avenue | Pierre, SD 57501
> >
> > 605.773.4345 | Casey.Heimerl@state.sd.us
> >
> > **From:** info@gfp.sd.us [mailto:info@gfp.sd.us]
> > **Sent:** Thursday, May 24, 2018 4:41 PM
> > **To:** jrieland@west-inc.com

Cc: Heimerl, Casey
Subject: Natural Heritage Program Data Request

South Dakota - Game, Fish, and Parks

Natural Heritage Program Data Request

A new form was just submitted from the http://gfp.sd.gov/ website with the following information:

ID:	8
Agency/Org/Business:	Western EcoSystems Technology, Inc. (WEST)
Name:	Janelle Rieland
Address:	7575 Golden Valley Road, Suite 350 Golden Valley, MN 55427
Email:	jrieland@west-inc.com
Phone:	612-310-8012
Fax:	
URL:	
Element or Subject:	Looking to obtain records of known federally and state-listed species and other environmentally sensitive resources located in or near a proposed project site.
Type of Data:	Shape files (ideally), location, and species information.
Purpose of Request:	Preliminary site evaluation

--

Janelle Rieland

Project Manager

Western Ecosystems Technology, Inc.
Environmental & Statistical Consultants

7575 Golden Valley Road, Suite 350

Golden Valley, MN 55427

Office - 763-270-0953

Cell - 612-310-8012

jrieland@west-inc.com

www.west-inc.com

Follow WEST: Facebook, Twitter, Linked In, Join our Mailing list

CONFIDENTIALITY NOTICE: This message and any accompanying communications are covered by the Electronic Communications Privacy Act, 18 U.S.C. §§ 2510-2521, and contain information that is privileged, confidential or otherwise protected from disclosure. If you are not the intended recipient or an agent responsible for delivering the communication to the intended recipient, you are hereby notified that you have received this communication in error. Dissemination, distribution or copying of this e-mail or the information herein by anyone other than the intended recipient, or an employee or agent responsible for delivering the message to the intended recipient, is prohibited. If you have received this communication in error, please notify us immediately by e-mail and delete the original message. Thank you.

Please consider the environment before printing.

--

Janelle Rieland

Project Manager

Western Ecosystems Technology, Inc.
Environmental & Statistical Consultants

7575 Golden Valley Road, Suite 350

Golden Valley, MN 55427

Office - 763-270-0953

Cell - 612-310-8012

jrieland@west-inc.com

www.west-inc.com

Follow WEST: Facebook, Twitter, Linked In, Join our Mailing list

CONFIDENTIALITY NOTICE: This message and any accompanying communications are covered by the Electronic Communications Privacy Act, 18 U.S.C. §§ 2510-2521, and contain information that is privileged, confidential or otherwise protected from disclosure. If you are not the intended recipient or an agent responsible for delivering the communication to the intended recipient, you are hereby notified that you have received this communication in error. Dissemination, distribution or copying of this e-mail or the information herein by anyone other than the intended recipient, or an employee or agent responsible for delivering the message to the intended recipient, is prohibited. If you have received this communication in error, please notify us immediately by e-mail and delete the original message. Thank you.

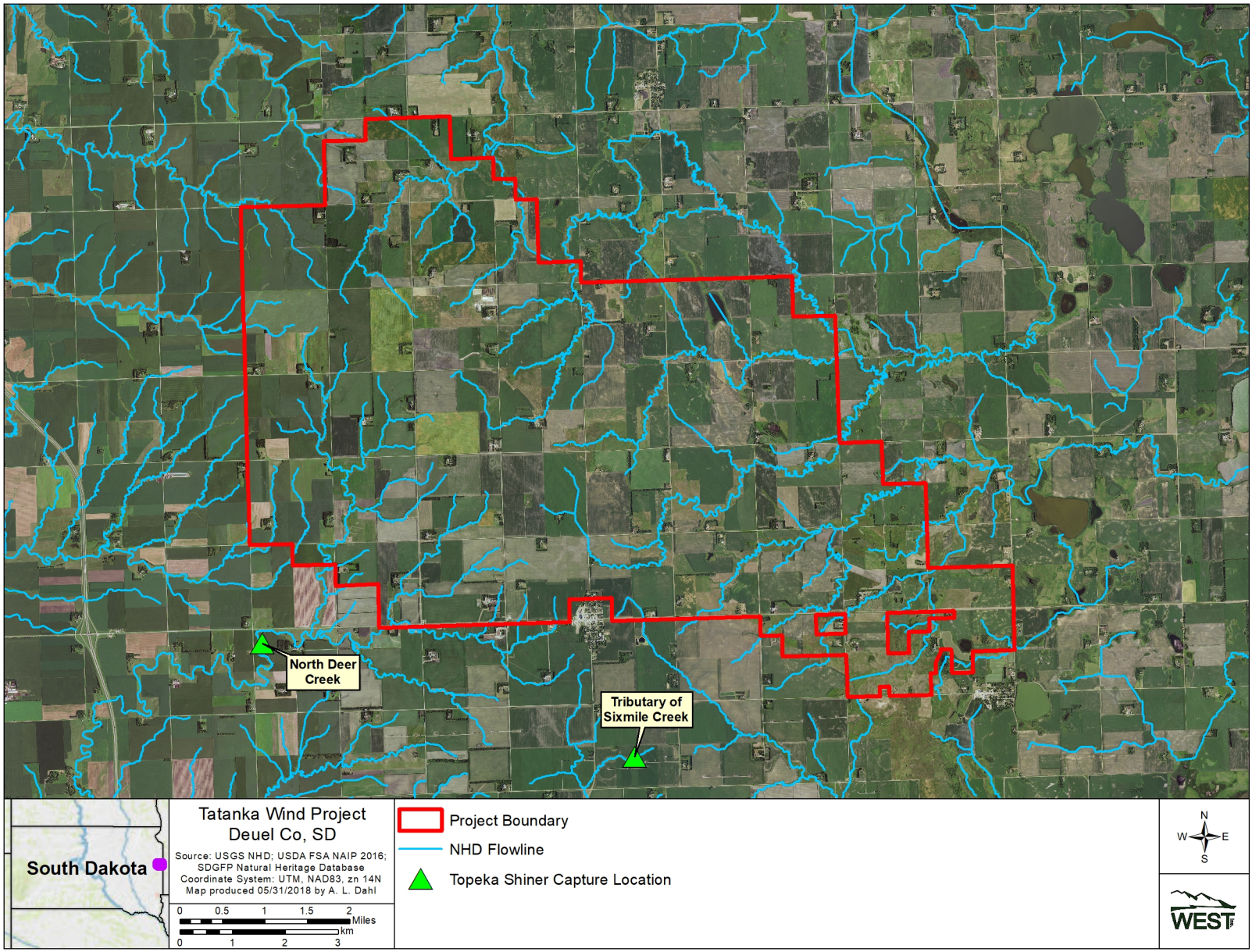
Please consider the environment before printing.

3 attachments

SDNHP-5-30-18.zip
3K

Invoice SDNHP-05-30-18-01.pdf
45K

EOdatafields.pdf
77K


North Deer Creek
Tributary of Sixmile Creek
South Dakota
Tatanka Wind Project
Deuel Co, SD
Source: USGS NHD; USDA FSA NAIP 2016; SDGFP Natural Heritage Database
Coordinate System: UTM, NAD83, zn 14N
Map produced 05/31/2018 by A. L. Dahl
0 0.5 1 1.5 2 Miles
0 1 2 3 km
Project Boundary
NHD Flowline
Topeka Shiner Capture Location
N
W E
S
WEST

Appendix K

Communication Tower Study

Wind Power GeoPlanner™

Communication Tower Study

Tatanka Wind Project

Prepared on Behalf of
Tatanka Ridge
Wind, LLC

May 8, 2019

COMSEARCH®
A CommScope Company

Table of Contents

1. Introduction - 1 -

2. Summary of Results - 1 -

3. Discussion of Separation Distances - 5 -

4. Conclusions - 5 -

5. Contact Us - 6 -

1. Introduction

This Communication Tower Study was performed for the Tatanka Wind Project in Deuel County, South Dakota to identify the tower structures as well as FCC-licensed communication antennas that exist in the project area. This information is useful in the planning stages of the wind energy facilities to identify turbine setbacks and to prevent disruption to the services provided by the tenants on the towers. This data can be used in support of the wind energy facilities communications needs in addition to avoiding any potential impact to the current communications services provided in the region.

2. Summary of Results

The communication towers and antennas in the study area were derived from a variety of sources including the FCC's Antenna Structure Registration (ASR) database, Universal Licensing System (ULS), national and regional tower owner databases, and the local planning and zoning boards. The data[1] was imported into GIS software and the structures mapped in the wind energy area of interest. Each tower location is identified with a unique ID number associated with detailed structure and contact information provided in a spreadsheet attachment.

Four tower structures and fifteen communication antennas were identified within the Tatanka Wind Project area using the data sources described in our methodology above. All four of the structures found were registered with the FCC and they contain nine of the fifteen communication antennas. The remaining antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops or portable structures. The specific type of structure would normally need to be determined by an on-site visit.

Detailed information about the tower structures and communication antennas is provided in Table 1 and Table 2 including location coordinates, structure height above ground level, and owner-operator name[2].

A discussion of turbine setback distances is provided in section three.

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

[2] Please note that this report analyzes all known operators on the towers from data sources available to Comsearch. Unidentified operators may exist on the towers due to unlicensed or federal government systems, mobile phone operators with proprietary locations, erroneous data on the FCC license, and other factors beyond our control.

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Closest Turbine (km)
Tower001	1213429	CCATT LLC	92.4	44.61688889	-96.71425000	0.69
Tower002	1041435	South Dakota, State of	91.4	44.59444444	-96.64750000	1.40
Tower003	1306309	Alpha 3E Corporation	129.2	44.59347222	-96.66433333	1.75
Tower004	1042181	Otter Tail Power Company	128	44.57361111	-96.66361111	2.54

Table 1: Summary of Tower Structures

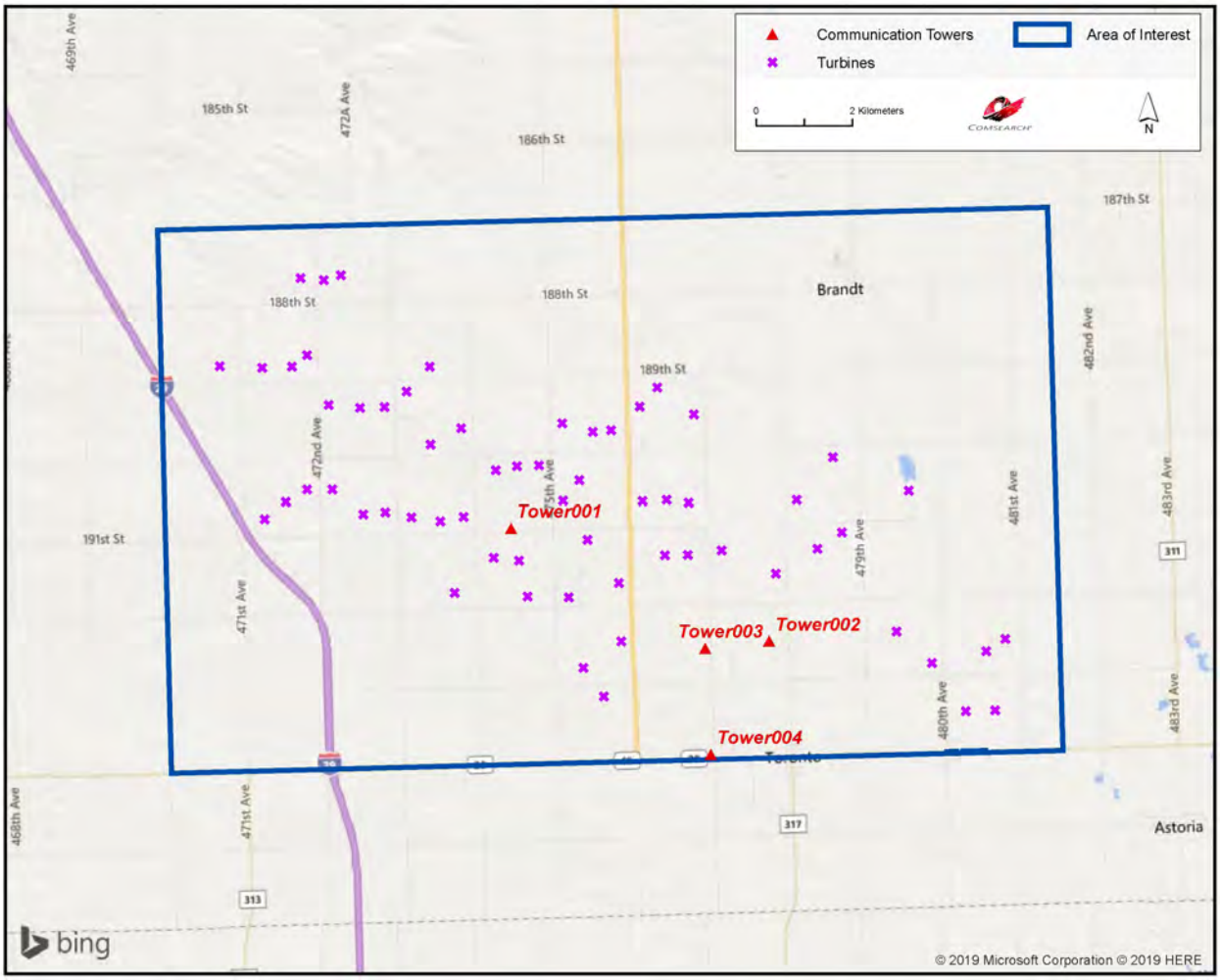


Figure 1: Towers within the Area of Interest

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Closest Turbine (km)
1		WPCR283	Land Mobile	BROOKINGS DEUEL RURAL WATER SYSTEM INC	24	44.633306	-96.683667	0.32
2		WPEC289	Land Mobile	SIOUX FALLS TWO WAY RADIO SERVICE INC.	61	44.631083	-96.680056	0.69
3		WPEU910	Land Mobile	CLEAR LAKE VET CLINIC	61	44.631083	-96.680056	0.69
4		WQEQ405	Land Mobile	EIDE, STACY	55	44.631056	-96.680056	0.69
5	Tower001	KNKN384	Cellular	AT&T Mobility Spectrum LLC	47.7	44.616861	-96.714250	0.69
6		KDBX	FM	Alpha 3E Licensee, LLC	113.0	44.612222	-96.678056	0.33
7		RXONLY	Microwave	Alpha 3E Licensee, LLC	30.5	44.612194	-96.678056	0.33
8	Tower003	WNFB441	Land Mobile	BROOKINGS DEUEL RURAL WATER SYSTEM INC	30	44.604694	-96.683111	0.31
9	Tower003	WPWA690	Land Mobile	BIT/State Radio Communications Engineering	82.3	44.594444	-96.647500	1.40
10	Tower003	WPWF366	Land Mobile	BIT/State Radio Communications Engineering	82.3	44.594444	-96.647500	1.40
11	Tower003	KBI853	Land Mobile	BIT/State Radio Communications Engineering	91	44.594417	-96.647556	1.41
12	Tower003	KDBX	FM	Alpha 3E Licensee, LLC	120.0	44.593611	-96.663889	1.78
13	Tower004	WQCY464	Land Mobile	OTTER TAIL POWER COMPANY	61/76	44.573611	-96.663611	2.54
14	Tower004	WNPZ939	Land Mobile	OTTER TAIL POWER COMPANY	128	44.573583	-96.663944	2.51
15	Tower004	WHI615	Microwave	Otter Tail Power Company	94.49/ 103.63	44.573556	-96.663639	2.54

Table 2: Summary of Communication Antennas

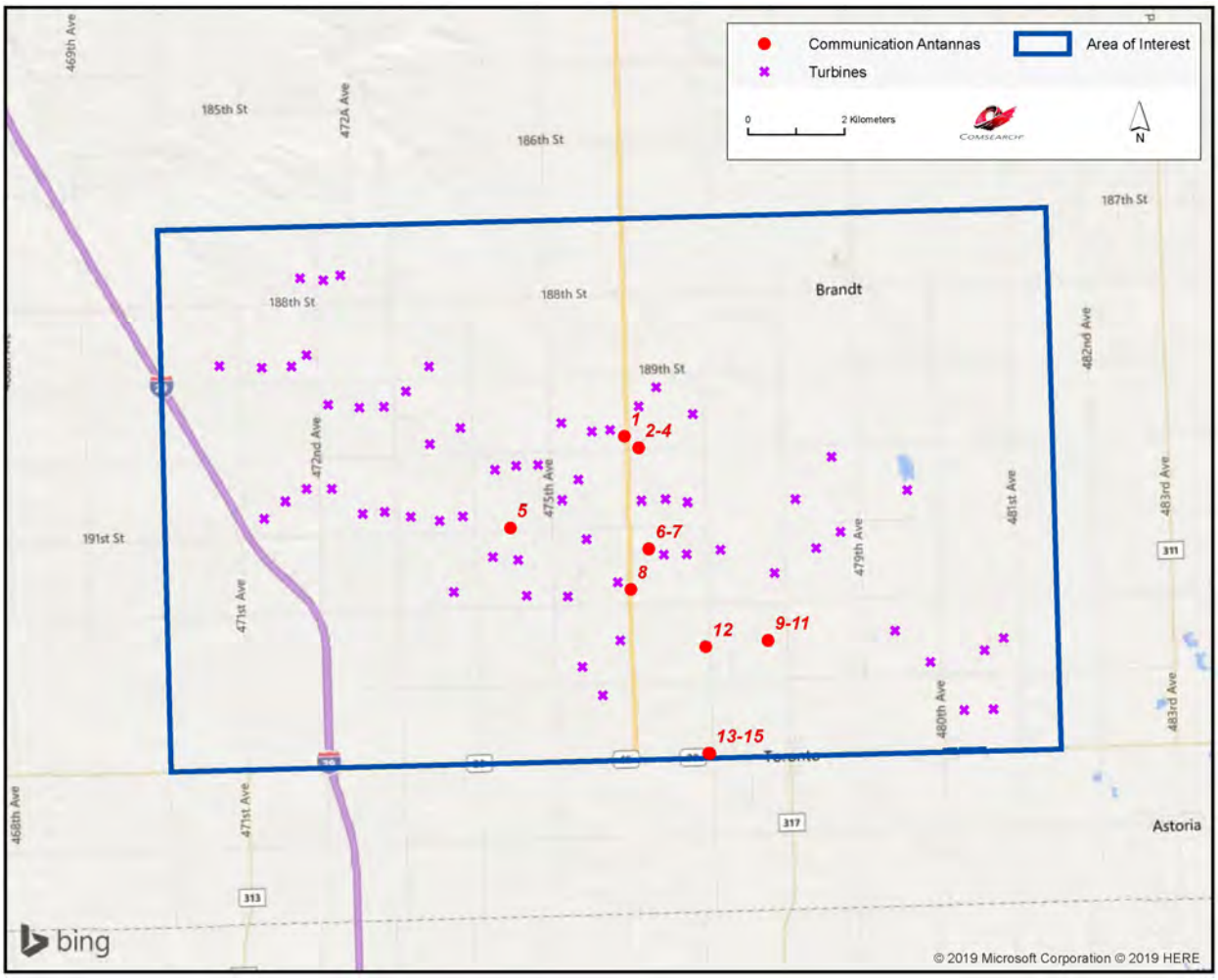


Figure 2: Communication Antennas within the Area of Interest

3. Discussion of Separation Distances

In planning the wind energy turbine locations, a conservative approach would dictate not locating any turbines in close proximity to existing tower structures to avoid any possible impact to the communications services provided by the structures. Reasonable distance between communication towers and wind turbine towers is a function of two things: (1) the physical turning radius of the wind turbine blades and (2) the characteristics of the communication systems on the communication tower.

Since wind turbine blades can rotate 360º, the first consideration of separation distance to other structures is clearance of the blades. If the blade radius is 50 meters, then a separation distance greater than 50 meters is necessary. From a practical standpoint, a setback distance greater than the maximum height of the turbine is necessary to insure a “fall” safety zone in the unlikely event of a turbine tower failure. Setback requirements for “fall” safety are typically specified by the local zoning ordinances.

The required separation distance based on the characteristics of the communication systems will vary depending on the type of communication antennas that are installed on the tower. For example, AM broadcast antennas should be separated by distances that allow for normal coverage which can extend up to 3 kilometers. For land mobile and mobile phone systems, setback distances are based on FCC interference emission limits from electrical devices in the land mobile and mobile phone frequency bands.

Finally, the tower structures identified could be a potential benefit in support of communications network needs for the wind energy facility. An example would be the implementation of a Supervisory Control and Data Acquisition (SCADA) system that monitors and provides communications access to the wind energy facility.

4. Conclusions

Our study identified four tower structures and fifteen communication antennas within the project area. They are used for microwave, cellular, FM and land mobile services in the area.

5. Contact Us

For questions or information regarding the Communication Tower Study, please contact:

Contact person: David Meyer
Title: Senior Manager
Company: Comsearch
Address: 19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone: 703-726-5656
Fax: 703-726-5595
Email: dmeyer@comsearch.com
Web site: www.comsearch.com

Appendix L

Microwave Path Analysis

Appendix M

AM/FM Radio Report

Wind Power GeoPlanner™

AM and FM Radio Report

Tatanka Wind Project

Prepared on Behalf of
TATANKA RIDGE
WIND, LLC

May 6, 2019

COMSEARCH®
A CommScope Company

Table of Contents

1. Introduction - 1 -

2. Summary of Results - 1 -

3. Impact Assessment - 5 -

4. Recommendations - 5 -

5. Contact - 6 -

1. Introduction

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Tatanka Wind Project in Deuel County, South Dakota.

2. Summary of Results

AM Radio Analysis
Comsearch did not find any database records[1] for AM stations within 30 kilometers of the Tatanka Wind Project.

ID	Call Sign	Status	Frequency (kHz)	Transmit ERP (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Required Separation Distance (km)	Distance to Nearest Turbine (km)
No AM Stations Found within 30 km of Project Area of Interest								

Table 1: AM Radio Stations within 30 Kilometers of Project Area

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

FM Radio Analysis

Comsearch determined that there were seven database records for FM stations within 30 kilometers of the Tatanka Wind Project, as shown in Table 2 and Figure 2. Only three of these stations are currently licensed and operating, two of which are translators that broadcast with limited range.

ID	Call Sign	Status[2]	Service[3]	Frequency (MHz)	Transmit ERP[4] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
1	KDBX	LIC	FM	107.1	9.8	44.612222	-96.678056	0.35
2	KDBX	CP	FM	107.1	9.9	44.593611	-96.663889	1.76
3	K205FL	LIC	FX	88.9	0.044	44.368889	-96.783611	25.13
4	K205FL	APP	FX	88.9	0.01	44.339472	-96.768556	27.98
5	K205FL	CP MOD	FX	89.1	0.25	44.339472	-96.768556	27.98
6	K209DX	LIC	FX	89.7	0.25	44.339444	-96.768611	27.98
7	K233BR	CP	FX	94.5	0.25	44.339444	-96.768611	27.98

Table 2: FM Radio Stations within 30 Kilometers

[2] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

[3] FM = FM broadcast station; FX = FM translator station; FL = Low-power FM station; FS = FM auxiliary (backup) station; FB = FM booster station.

[4] ERP = Transmit Effective Radiated Power.

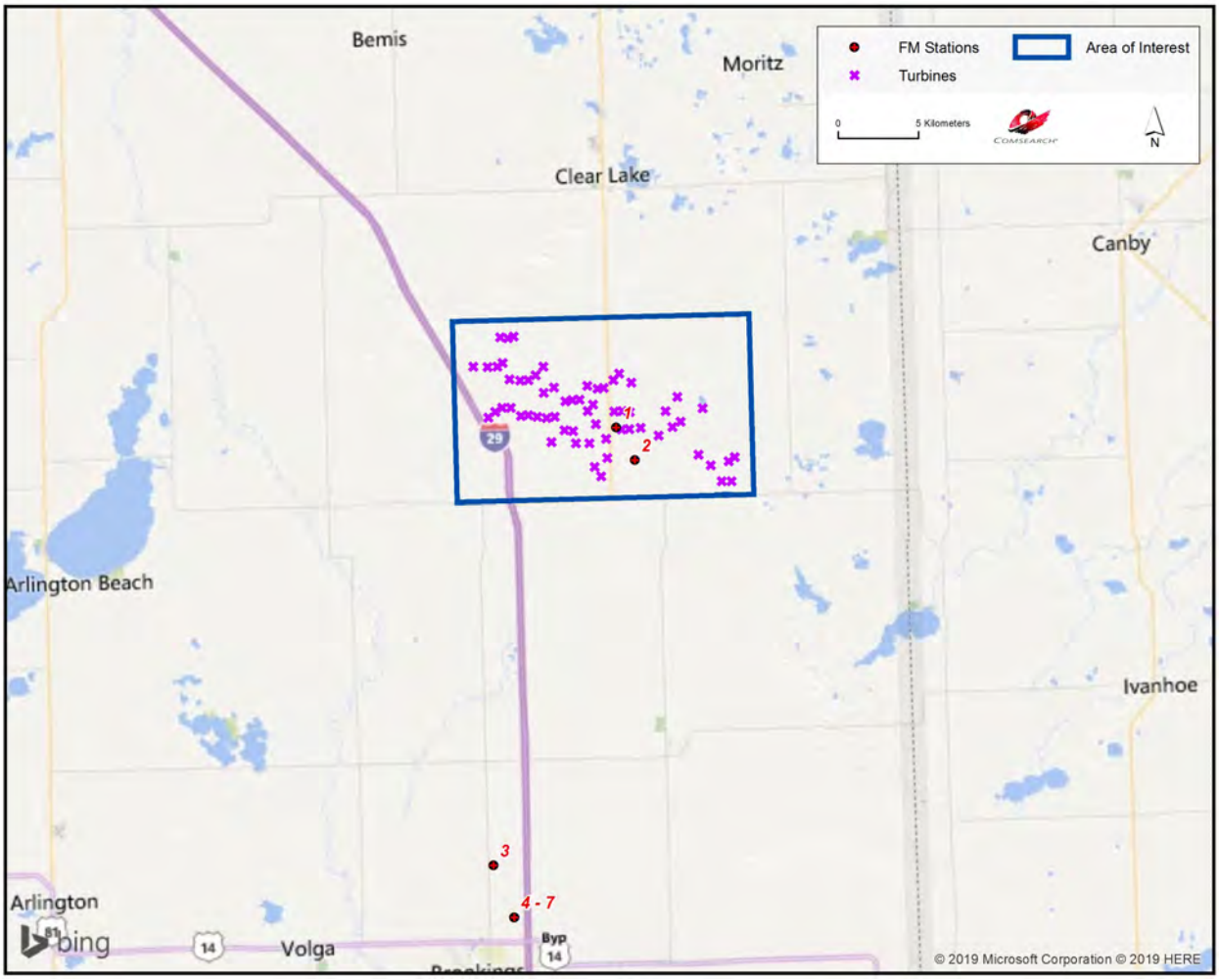


Figure 1: FM Radio Stations within 30 Kilometers

Due to its close proximity to the proposed wind turbines, Comsearch used aerial imagery to verify the location of FM station KDBX[5]. The station's actual location was identified at 44.612238° N, 96.678068° W (NAD 83), approximately 26 meters northeast of the location defined by the coordinates listed on the station's FCC license (see Figure 2). This places KDBX within 333 meters of the nearest turbine in the Tatanka Wind Project, E1.

Figure 2: Location of FM Station KRXL with Respect to Location Listed on FCC License

[5] A small amount of variance between a station's actual geographic coordinates and those reported on the station's license is fairly typical.

3. Impact Assessment

The exclusion distance for AM broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the lesser of 10 wavelengths or 3 kilometers. For non-directional antennas, the exclusion distance is simply equal to 1 wavelength. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from wind turbine towers. As there were no stations found within 3 kilometers of project, which is the maximum possible exclusion distance based on a directional AM antenna broadcasting at 1000 KHz or less, the project should not impact the coverage of local AM stations.

The coverage of FM stations is generally not susceptible to interference caused by large objects, such as wind turbines, especially when they are sited in the *far field* region of the radiating FM antenna, which mitigates the risk of distorting the antenna's radiation pattern. However, within the antenna's *near field* region, radiation pattern distortion can become a factor. Signal attenuation is also possible but can be difficult to quantify without precise field measurements.

The closest operational station to the Tatanka Wind Project, KDBX, is located approximately 332.5 meters from the nearest turbine (E1). After considering the rotational sweep of the turbine blades (63.5 meters), the total separation distance between the station antenna and the tip of turbine blades reduces to 269 meters. Based on the antenna configuration indicated on the license of FM station KDBX[6], a conservative near field radius was calculated at 141 meters. Station KDBX and its proximity to the proposed turbines are depicted above in Figure 2. Because the blade sweep of turbine E1 clears the near field of station KDBX by approximately 128 meters, the station should not be impacted by the proposed turbines.

The next closest operational FM station to the project, K205FL, is more than 25.1 kilometers from the nearest turbine and well out of range of impact.

4. Recommendations

Since our analysis did not identify any impact to the AM or FM broadcast stations, no recommendations or mitigation techniques are required for this project.

[6] KDBX employs ERI model LPX-5E with five bays.

5. Contact

For questions or information regarding the AM and FM Radio Report, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	dmeyer@comsearch.com
Web site:	www.comsearch.com

Appendix N

Sound Modeling

JACOBS®

Memorandum

2020 SW Fourth AVE, 3rd FLR
Portland, OR 97201
T + 503.235.5000
F + 503.736.2000
www.jacobs.com

Subject	**Tatanka Ridge Wind Project Sound Modeling**
Attention	Jesse Bermel/Avangrid Renewables, LLC
From	Mark Bastasch/Jacobs Engineering Group, Inc.
Date	April 29, 2019

This technical memorandum provides the predicted sound levels for the Tatanka Ridge Wind Project (Project) proposed by Tatanka Ridge Wind, LLC (Tatanka Ridge) a subsidiary of Avangrid Renewables, LLC (Avangrid Renewables). This analysis is based on 62 wind turbine locations (55 primary locations and 7 potential alternate locations) and a substation transformer. Figure 1 (attached) presents the Project's proposed wind turbine layout and the predicted sound level based on the analysis described herein, as well as the residences that have been identified by Avangrid Renewables. Deuel County's zoning ordinance establishes a sound limit to 45 dBA at non-participating residents. An acoustical model of the predicted Project sound levels results in levels of 44 dBA at existing non-participating residences, which complies with the Deuel County sound requirements not to exceed 45 dBA at non-participating residences. These results are based on 62 turbine locations, while the Project is committed to building only 55 turbines. The Tatanka Ridge Wind Project is committed to designing and operating the Project in compliance with the Deuel County noise standard.

1. Regulatory Requirements and Modeling Methods

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.*" Standard acoustical engineering methods were used in the analysis to document the predicted sound level at existing non-participating residences. The sound power levels representing the standard performance of the wind turbines are assigned based on International Electrotechnical Commission (IEC) Standard 61400-11 (2012) data supplied by the manufacturer, General Electric (GE), to Avangrid Renewables. The stated maximum turbine sound power levels for the GE116 Low Noise Trailing Edge (LNTE) is 106 decibels A-weighted scale (dBA). Similarly, the sound power level of the GE127 LNTE is 108.5 dBA. The sound power levels used for modeling the turbines was increased by 2 dBA in this assessment. The substation transformer specifications are expected to require a National Electrical Manufacturers Association sound rating of 76 dBA, resulting in a sound power level of 96 dBA.

Using these sound power levels as a basis, the model calculates the sound pressure level that would occur after losses from distance, air absorption, ground effects, and screening are considered.

It is useful to understand the difference between a sound pressure level (or noise level) and a sound power level. A sound power level (commonly abbreviated as PWL or L_w) is analogous to the wattage of a light bulb; it is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level (commonly abbreviated as SPL or L_p) is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound level meter. Sound pressure levels always should be specified with a location or distance from the noise source.

Sound power level data is used in acoustic models to predict sound pressure levels. This is because sound power levels consider the size of the acoustical source and account for the total acoustical energy emitted by the source. For example, the sound pressure level 15 feet from a small radio and a large orchestra may be the same, but the sound power level of the orchestra will be much larger because it emits sound over a larger area. Similarly, 2-horsepower (hp) and 2,000-hp pumps can both achieve 85 dBA at 3 feet (a common specification), but the 2,000-hp pump will have significantly larger sound power level. Consequently, the sound from the 2,000-hp pump will travel farther. A sound power level can be determined from a sound pressure level if the distance from and dimensions of the source are known, and this is accounted for in the IEC 61400-11 standard for wind turbines. Sound power levels always will be greater than sound pressure levels and sound power levels should never be compared to sound pressure levels. The sound power level of commercially available modern wind turbines typically will vary between 100 and 110 dBA depending on make, model, and windspeed. This will result in a sound pressure level of about 55 to 65 dBA at 130 feet from the turbine. These levels are well below the sound pressure level where hearing protection is considered (85 dBA).

The commercial software used to prepare the acoustical model is Cadna/A by DataKustik GmbH, Version 2019 (build: 169.4915). 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). Cadna/A as well as ISO 9613-2 have been used by researchers and regulatory bodies throughout the world in similar wind turbine sound evaluations. The ISO 9613-2 method is based on an omnidirectional downwind condition. That is, the sound prediction algorithms assume every point at which sound level is calculated is downwind of all noise-emitting equipment simultaneously. In essence, the prediction assumes each receiver or prediction point is a “black hole” and the wind is blowing from each turbine and into this black hole. While this is physically impossible, the ISO 9613-2 model has been widely and successfully used to develop acoustical models for wind energy as well as other facilities. Numerous agencies and regulatory bodies rely on properly conducted ISO 9613-2 modeling. The ISO 9613-2 parameters used in this assessment are a receptor height of 4 meters 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 dBA.

The turbines were evaluated with the sound being emitted at hub height (90 meters for the GE116 and 88.6 meters for the GE127). Atmospheric absorption for conditions of 10 degrees Celsius and 70 percent relative humidity (conditions that favor propagation) was computed in accordance with ISO 9613-1, Acoustics—Sound Attenuation During Propagation Outdoors, Part 1: Calculation of the Absorption of Sound by the Atmosphere (ISO, 1993). Coordinates of the sound sources and residences included in this assessment have been provided by Avangrid Renewables and are included in Tables 1 and 2, respectively.

Table 1. Modeled Sound Sources

Source ID	Sound Power Level (dBA)	Source Spectrum	Height (m)	Coordinates	
				X (m)	Y (m)
A1	110.5	GE127LNTE+2	88.6	690799	4939136
A2	110.5	GE127LNTE+2	88.6	691407	4939152
B1	110.5	GE127LNTE+2	88.6	690097	4940133
B2	110.5	GE127LNTE+2	88.6	691218	4940385
B3	110.5	GE127LNTE+2	88.6	691615	4940639
C5	110.5	GE127LNTE+2	88.6	689357	4940791
E1	108	GE116LNTE+2	90	684544	4942375
E2	108	GE116LNTE+2	90	685022	4942384
E3	108	GE116LNTE+2	90	685724	4942474
E4	110.5	GE127LNTE+2	88.6	686854	4941987

Table 1. Modeled Sound Sources

Source ID	Sound Power Level (dBA)	Source Spectrum	Height (m)	Coordinates	
				X (m)	Y (m)
E5	110.5	GE127LNTE+2	88.6	687711	4942510
E6	110.5	GE127LNTE+2	88.6	688223	4942843
F1	110.5	GE127LNTE+2	88.6	687280	4943515
F2	110.5	GE127LNTE+2	88.6	688033	4944395
F4	110.5	GE127LNTE+2	88.6	689608	4943698
G1	108	GE116LNTE+2	90	684078	4943490
G2	108	GE116LNTE+2	90	684583	4943517
G3	108	GE116LNTE+2	90	685040	4943455
H1	110.5	GE127LNTE+2	88.6	681030	4944127
H2	110.5	GE127LNTE+2	88.6	681471	4944211
H3	110.5	GE127LNTE+2	88.6	681931	4944224
H4	110.5	GE127LNTE+2	88.6	682427	4943501
H5	110.5	GE127LNTE+2	88.6	682765	4943922
I2	110.5	GE127LNTE+2	88.6	682410	4945098
I3	110.5	GE127LNTE+2	88.6	683048	4944921
I4	110.5	GE127LNTE+2	88.6	683432	4944956
I5	110.5	GE127LNTE+2	88.6	685151	4945281
J1	110.5	GE127LNTE+2	88.6	684023	4945449
J2	110.5	GE127LNTE+2	88.6	684389	4945846
K0	110.5	GE127LNTE+2	88.6	676230	4943117
K1	110.5	GE127LNTE+2	88.6	676670	4943472
K2	110.5	GE127LNTE+2	88.6	677108	4943724
K3	110.5	GE127LNTE+2	88.6	677637	4943727
K4	110.5	GE127LNTE+2	88.6	678278	4943221
K5	110.5	GE127LNTE+2	88.6	678736	4943263
K6	110.5	GE127LNTE+2	88.6	679281	4943157
K7	110.5	GE127LNTE+2	88.6	679879	4943079
K8	110.5	GE127LNTE+2	88.6	680365	4943168
L1	110.5	GE127LNTE+2	88.6	675295	4946281
L10	110.5	GE127LNTE+2	88.6	679680	4944655
L11	110.5	GE127LNTE+2	88.6	680314	4944999
L2	110.5	GE127LNTE+2	88.6	676183	4946247
L3	110.5	GE127LNTE+2	88.6	676798	4946277
L4	110.5	GE127LNTE+2	88.6	677113	4946511
L5	110.5	GE127LNTE+2	88.6	677560	4945484
L6	110.5	GE127LNTE+2	88.6	678208	4945420
L7	110.5	GE127LNTE+2	88.6	678716	4945435
L8	110.5	GE127LNTE+2	88.6	679174	4945757

Table 1. Modeled Sound Sources

Source ID	Sound Power Level (dBA)	Source Spectrum	Height (m)	Coordinates	
				X (m)	Y (m)
L9	110.5	GE127LNTE+2	88.6	679657	4946274
O3	110.5	GE127LNTE+2	88.6	683641	4940587
O4	110.5	GE127LNTE+2	88.6	682854	4940037
O5	110.5	GE127LNTE+2	88.6	683275	4939446
P1	110.5	GE127LNTE+2	88.6	680174	4941593
P3	110.5	GE127LNTE+2	88.6	680988	4942323
P4	110.5	GE127LNTE+2	88.6	681515	4942260
P5	110.5	GE127LNTE+2	88.6	681693	4941514
P6	110.5	GE127LNTE+2	88.6	682544	4941503
P7	110.5	GE127LNTE+2	88.6	682938	4942691
P8	110.5	GE127LNTE+2	88.6	683589	4941798
S5	110.5	GE127LNTE+2	88.6	676976	4948113
S6	110.5	GE127LNTE+2	88.6	677460	4948073
S8	110.5	GE127LNTE+2	88.6	677815	4948173
Transformer	96	Transformer	4	692269	4939331

Notes:
dBA = decibel (A-weighted scale)
ID = identifier
m = meter(s)

Table 2. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)	Height (m)	Coordinates	
				X (m)	Y (m)
Participating	H155	49	4	678585	4942822
Participating	H81	49	4	678919	4943688
Participating	H76	49	4	680833	4942902
Participating	H89	49	4	679515	4945123
Participating	H75	48	4	681840	4942678
Participating	H74	48	4	683780	4942251
Participating	H72	48	4	682934	4941994
Participating	H156	48	4	676014	4943529
Participating	H158	47	4	678182	4946033
Participating	H77	47	4	681688	4942911
Participating	H86	47	4	684161	4944755
Participating	H43	46	4	683463	4939028
Participating	H145	46	4	676613	4947704
Participating	H163	46	4	675547	4946765

Table 2. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)	Height (m)	Coordinates	
				X (m)	Y (m)
Participating	H147	46	4	677166	4948738
Participating	H160	46	4	675633	4946794
Participating	H71	45	4	686229	4941921
Participating	H58	45	4	682263	4940123
Participating	H80	45	4	688300	4943646
Participating	H161	45	4	676584	4947413
Participating	H146	45	4	676373	4947953
Participating	H63	45	4	680616	4941080
Participating	H117	45	4	678375	4948421
Participating	H159	45	4	675799	4945577
Participating	H164	44	4	688863	4943158
Nonparticipating	H83	44	4	685334	4944133
Participating	H53	44	4	689381	4939944
Nonparticipating	H137	44	4	674779	4945951
Participating	H85	44	4	687326	4944518
Participating	H50	44	4	684050	4939765
Nonparticipating	H78	43	4	689062	4942941
Nonparticipating	H45	43	4	682524	4939180
Participating	H66	43	4	691388	4941342
Nonparticipating	H93	43	4	682055	4945939
Nonparticipating	H64	43	4	684540	4941185
Nonparticipating	H98	43	4	682904	4946155
Participating	H60	43	4	688637	4940736
Participating	H36	43	4	690696	4938383
Nonparticipating	H157	43	4	675808	4944069
Participating	H68	43	4	685385	4941463
Nonparticipating	H144	42	4	676071	4947608
Participating	H67	42	4	688636	4941413
Nonparticipating	H162	42	4	678852	4947413
Participating	H65	41	4	679189	4941266
Participating	H101	41	4	683599	4946691
Nonparticipating	H102	41	4	684074	4946851
Nonparticipating	H87	41	4	688741	4944987
Participating	H62	41	4	687368	4941026
Nonparticipating	H69	41	4	690352	4941587
Nonparticipating	H88	40	4	687136	4945116
Nonparticipating	H54	40	4	688658	4939959
Nonparticipating	H104	40	4	680692	4947086

Table 2. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)	Height (m)	Coordinates	
				X (m)	Y (m)
Nonparticipating	H55	40	4	681031	4940013
Participating	H40	40	4	692283	4938611
Nonparticipating	H33	39	4	691948	4938171
Nonparticipating	H154	39	4	675757	4941934
Nonparticipating	H132	38	4	674929	4944253
Nonparticipating	H25	38	4	690715	4937792
Nonparticipating	H59	38	4	686562	4940149
Participating	H52	38	4	687955	4939871
Nonparticipating	H105	37	4	684957	4947425
Nonparticipating	H108	37	4	681028	4947822
Nonparticipating	H106	37	4	684194	4947619
Nonparticipating	H152	37	4	676826	4941169
Nonparticipating	H133	37	4	674171	4945237
Participating	H28	37	4	683448	4937988
Nonparticipating	H116	37	4	677958	4949878
Participating	H26	37	4	682715	4937976
Nonparticipating	H49	37	4	686281	4939710
Nonparticipating	H92	37	4	688489	4945892
Nonparticipating	H95	37	4	687770	4946076
Nonparticipating	H109	36	4	683484	4947898
Nonparticipating	H141	36	4	674202	4947455
Participating	H23	36	4	691912	4937732
Nonparticipating	H142	36	4	674195	4947534
Nonparticipating	H38	36	4	688821	4938498
Nonparticipating	H153	36	4	675873	4941177
Participating	H24	36	4	692163	4937775
Participating	H46	36	4	687223	4939256
Nonparticipating	H41	36	4	685817	4938898
Nonparticipating	H37	36	4	685209	4938467
Nonparticipating	H96	35	4	688841	4946145
Participating	H150	35	4	678221	4939683
Nonparticipating	H34	35	4	688367	4938286
Nonparticipating	H151	35	4	677418	4939868
Participating	H128	35	4	678716	4939141
Nonparticipating	H17	35	4	684084	4937488
Nonparticipating	H130	35	4	675574	4940786
Participating	H20	34	4	681578	4937615
Nonparticipating	H30	34	4	680611	4938073

Table 2. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)	Height (m)	Coordinates	
				X (m)	Y (m)
Nonparticipating	H14	34	4	690508	4937083
Nonparticipating	H136	34	4	673228	4946679
Nonparticipating	H32	34	4	686745	4938142
Nonparticipating	H94	34	4	690052	4945991
Nonparticipating	H99	34	4	689630	4946277
Nonparticipating	H134	34	4	673086	4945901
Nonparticipating	H18	34	4	688764	4937521
Nonparticipating	H138	34	4	673333	4947545
Nonparticipating	H135	34	4	672956	4945917
Participating	H119	33	4	680671	4937573
Nonparticipating	H121	33	4	679979	4937635
Participating	H9	33	4	682277	4936774
Participating	H118	33	4	681391	4936894
Nonparticipating	H124	33	4	679249	4937641
Participating	H114	32	4	682887	4936492
Nonparticipating	H129	32	4	677481	4938248
Participating	H122	32	4	680705	4936501
Nonparticipating	H123	31	4	679220	4936990
Nonparticipating	H126	31	4	677489	4937617
Nonparticipating	H139	31	4	672465	4948293
Nonparticipating	H140	31	4	672468	4948419
Nonparticipating	H125	30	4	677541	4936351

Notes:
dBA = decibel (A-weighted scale)
ID = identifier
m = meter(s)

2. Results

As indicated in Table 2, the highest predicted level at nonparticipating residence is 44 dBA, consistent with the Deuel County requirement of 45 dBA average A-weighted sound pressure level at existing nonparticipating dwellings.[1] While Deuel County has not established a sound limit for participating residences, the highest predicted level at a participant is 49 dBA. These results are based on 62 turbines which is 7 more than the Projects stated maximum buildout of 55 locations. As turbine technology continues to evolve, Tatanka Ridge intends to obtain multiple bids for the Project and evaluate multiple technologies. The final turbine locations will be selected based on a subset of the 62 locations identified in this analysis.

The ISO 9613-2 method and acoustical model provide a standardized assessment of predicted sound levels at residences. The results may vary depending on a number of factors, including timescale, metric

[1] Attachment A presents predicted results based on other common modeling parameters. These results also predict the project will comply with the applicable standard of 45 dBA at non-participating dwellings.

and method of evaluation. The Tatanka Ridge Wind Project is committed to designing and operating the Project in compliance with the Deuel County noise standard.

3. Construction Noise

Typical construction equipment noise levels have been published in the Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide (FHWA, 2006). The User's Guide provides one of the most recent and comprehensive assessment of noise levels from construction equipment. Table 3 provides typical sound levels and usage factors for general construction equipment and activities consistent with the FHWA Roadway Construction Noise Model. The acoustical usage factor does not equate to the percentage of time the equipment is in use, but rather the percentage of time that it is operated at its highest sound emission level. For example, a back hoe may be used and energized during the entire shift, but on average, it is expected to operate at its highest sound level 40 percent of the time.

Table 3. Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Specified Sound Level 50 feet (dBA)	Actual Measured Sound Level 50 feet (dBA)
All Other Equipment Greater than 5 Horsepower	50	85	N/A
Auger Drill Rig	20	85	84
Backhoe	40	80	78
Bar Bender	20	80	N/A
Blasting	N/A	94	N/A
Boring Jack Power Unit	50	80	83
Chain Saw	20	85	84
Clam Shovel (dropping)	20	93	87
Compactor (ground)	20	80	83
Compressor (air)	40	80	78
Concrete Batch Plant	15	83	N/A
Concrete Mixer Truck	40	85	79
Concrete Pump Truck	20	82	81
Concrete Saw	20	90	90
Crane	16	85	81
Dozer	40	85	82
Drill Rig Truck	20	84	79
Drum Mixer	50	80	80
Dump Truck	40	84	76
Excavator	40	85	81
Flat Bed Truck	40	84	74
Front End Loader	40	80	79
Generator	50	82	81
Generator (less than 25 kilovolt-amperes, VMS signs)	50	70	73
Gradall	40	85	83
Grader	40	85	N/A
Grapple (on backhoe)	40	85	87
Horizontal Boring Hydraulic Jack	25	80	82
Hydra Break Ram	10	90	N/A
Impact Pile Driver	20	95	101
Jackhammer	20	85	89
Man Lift	20	85	75

Table 3. Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Specified Sound Level 50 feet (dBA)	Actual Measured Sound Level 50 feet (dBA)
Mounted Impact Hammer (hoe ram)	20	90	90
Pavement Scarafier	20	85	90
Paver	50	85	77
Pickup Truck	40	55	75
Pneumatic Tools	50	85	85
Pumps	50	77	81
Refrigerator Unit	100	82	73
Rivet Buster/chipping gun	20	85	79
Rock Drill	20	85	81
Roller	20	85	80
Sand Blasting (single nozzle)	20	85	96
Scraper	40	85	84
Shears (on backhoe)	40	85	96
Slurry Plant	100	78	78
Slurry Trenching Machine	50	82	80
Soil Mix Drill Rig	50	80	N/A
Tractor	40	84	N/A
Vacuum Excavator (vac-truck)	40	85	85
Vacuum Street Sweeper	10	80	82
Ventilation Fan	100	85	79
Vibrating Hopper	50	85	87
Vibratory Concrete Mixer	20	80	80
Vibratory Pile Driver	20	95	101
Warning Horn	5	85	83
Welder/Torch	40	73	74

Source: FHWA, 2006.
N/A = not applicable

Review of the typical construction equipment noise levels in Table 3 indicates that the loudest equipment generally emits noise in the range of 80 to 90 dBA at 50 feet, with usage factors of 40 to 50 percent. The types and numbers of construction equipment near any specific receptor location will vary over time. While construction is a dynamic activity, the sound level at any specific location is dominated by the closest and loudest equipment and the following assumptions were used to modeling construction noise:

- One piece of equipment generating a reference noise level of 85 dBA (at 50-foot distance with a 40 percent usage factor) located at the new turbine or road.
- Two pieces of equipment generating reference 85-dBA noise levels located 50 feet farther away from new turbine or road (100 feet distance with a 40 percent usage factor).
- Two additional pieces of equipment generating reference 85-dBA noise levels located 100 feet farther away new turbine or road (200 feet distance with a 40 percent usage factor).

Table 4 presents construction equipment noise levels at various distances based on this scenario. This scenario is anticipated to be conservative given only distance loss are accounted for and the reductions afforded by ground absorption or other factors have not been considered in these results.

Table 4. Typical Construction Equipment Noise Levels Versus Distance

Distance from Construction Activity (feet)	Average Sound Level (dBA)
100	79
200	74
400	69
800	63
1,600	58
3,200	52

Notes:
See text narrative preceding this table for the parameters of this noise modeling scenario.

4. Conclusions

An acoustical model of the predicted Project sound levels results in levels below 45 dBA at existing non-participating residence, consistent with the Deuel County sound requirements. These results are based on 62 turbine locations, while the Project is committed to building only 55 turbines.

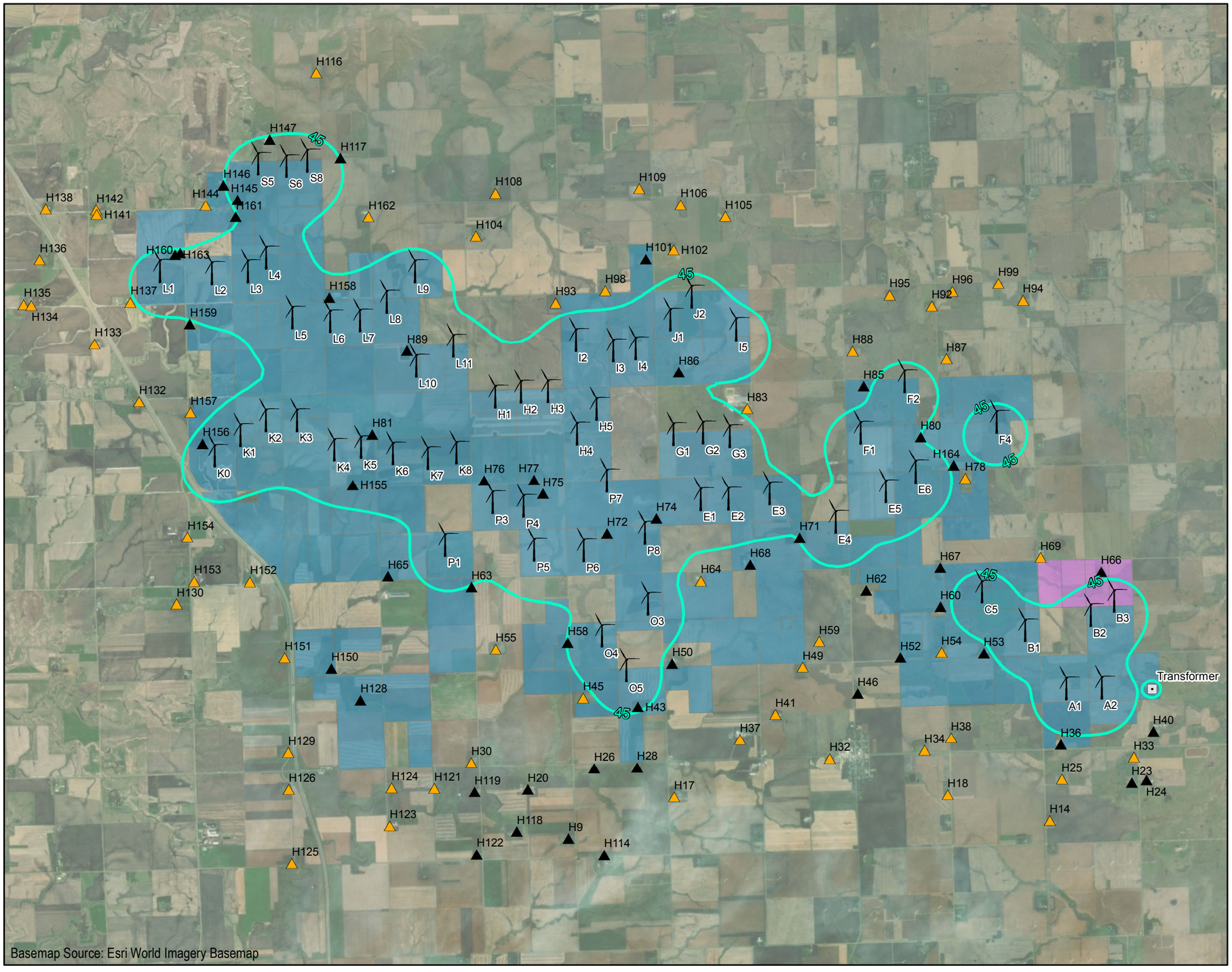
5. References

International Electrotechnical Commission (IEC). 2012. IEC 61400-11. Wind turbines - Part 11: Acoustic noise measurement techniques.

International Organization for Standardization (ISO) 1993. ISO 9613-1, Acoustics—Sound Attenuation During Propagation Outdoors. Part 1: Calculation of the Absorption of Sound by the Atmosphere. Geneva, Switzerland.

International Organization for Standardization (ISO). 1996. ISO 9613-2, Acoustics—Sound Attenuation During Propagation Outdoors. Part 2: General Method of Calculation. Geneva, Switzerland.

Figure



LEGEND

Turbine Location

Transformer

Predicted Sound Pressure Level (dBA)

45

Occupied Residence (Participating Status)

Participating

Nonparticipating

Property Agreement Status

Signed

Negotiating Transmission Line Easement

C:\USERS\GGEE\DOCUMENTS\GIS\BASTACH_PROJECT\TATANKA\MAPFILES\TATANKA_SOUND_041719.MXD GGEE 4/22/2019 12:37:29 PM

Figure 1
Predicted Sound Pressure Levels (dBA)
Scenario: Mixed
Tatanka Ridge Wind Project

JACOBS

Appendix A

Comparisons of Modeling Methods

As discussed in Section 1, this analysis is based on ISO 9613-2 modeling parameters of mixed ground (G=0.5), receiver height of 4 meters and includes a +2 dBA adjustment to the turbine sound power level. Table A1, below, re-presents these under the "Mixed Ground Scenario" heading. Results are also presented for a "Hard Ground Scenario" which utilizes a hard ground factor (G=0, presuming concrete or pavement) and does not use an increased turbine sound power level. As shown below, the results between these two scenarios is similar. A document prepared for the National Association of Regulatory Utility Commissioners (NARUC)[2] identified modeling parameters of mixed ground condition (G=0.5), a receptor height of 1.5 meters and does not use an increased turbine sound power level. The results for the NARUC modeling parameters are presented in Table A1. As shown in Table A1, the mixed and hard ground scenarios result in higher or more conservative predictions than the NARUC scenario.

Table A1. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)		
		Mixed Ground Scenario (Figure 1)	Hard Ground Scenario (Figure A-1)	NARUC Scenario (Figure A-2)
Participating	H155	49	49	47
Participating	H81	49	49	46
Participating	H76	49	49	46
Participating	H89	49	49	46
Participating	H75	48	48	45
Participating	H74	48	48	45
Participating	H72	48	48	45
Participating	H156	48	47	45
Participating	H158	47	47	45
Participating	H77	47	47	44
Participating	H86	47	47	44
Participating	H43	46	46	44
Participating	H145	46	46	43
Participating	H163	46	46	43
Participating	H147	46	46	43
Participating	H160	46	45	43
Participating	H71	45	45	42
Participating	H58	45	45	42
Participating	H80	45	45	42
Participating	H161	45	45	42
Participating	H146	45	45	42
Participating	H63	45	45	42
Participating	H117	45	45	42
Participating	H159	45	44	42
Participating	H164	44	44	41
Nonparticipating	H83	44	44	41

[2] National Association of Regulatory Utility Commissioners (NARUC). 2011. Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects. NARUC Grants & Research. The National Association of Regulatory Utility Commissioners. A report for the Minnesota PUC, Funded by the U.S. Department of Energy.

Table A1. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)		
		Mixed Ground Scenario (Figure 1)	Hard Ground Scenario (Figure A-1)	NARUC Scenario (Figure A-2)
Participating	H53	44	44	41
Nonparticipating	H137	44	44	41
Participating	H85	44	44	41
Participating	H50	44	43	41
Nonparticipating	H78	43	43	40
Nonparticipating	H45	43	43	40
Participating	H66	43	43	40
Nonparticipating	H93	43	43	40
Nonparticipating	H64	43	43	40
Nonparticipating	H98	43	43	40
Participating	H60	43	43	40
Participating	H36	43	43	40
Nonparticipating	H157	43	43	40
Participating	H68	43	43	39
Nonparticipating	H144	42	42	39
Participating	H67	42	42	39
Nonparticipating	H162	42	42	39
Participating	H65	41	41	38
Participating	H101	41	41	38
Nonparticipating	H102	41	41	38
Nonparticipating	H87	41	41	38
Participating	H62	41	41	38
Nonparticipating	H69	41	40	38
Nonparticipating	H88	40	40	37
Nonparticipating	H54	40	40	37
Nonparticipating	H104	40	40	37
Nonparticipating	H55	40	40	37
Participating	H40	40	40	37
Nonparticipating	H33	39	39	36
Nonparticipating	H154	39	39	36
Nonparticipating	H132	38	38	35
Nonparticipating	H25	38	38	35
Nonparticipating	H59	38	38	34
Participating	H52	38	38	35
Nonparticipating	H105	37	38	34
Nonparticipating	H108	37	38	34
Nonparticipating	H106	37	37	34
Nonparticipating	H152	37	37	34

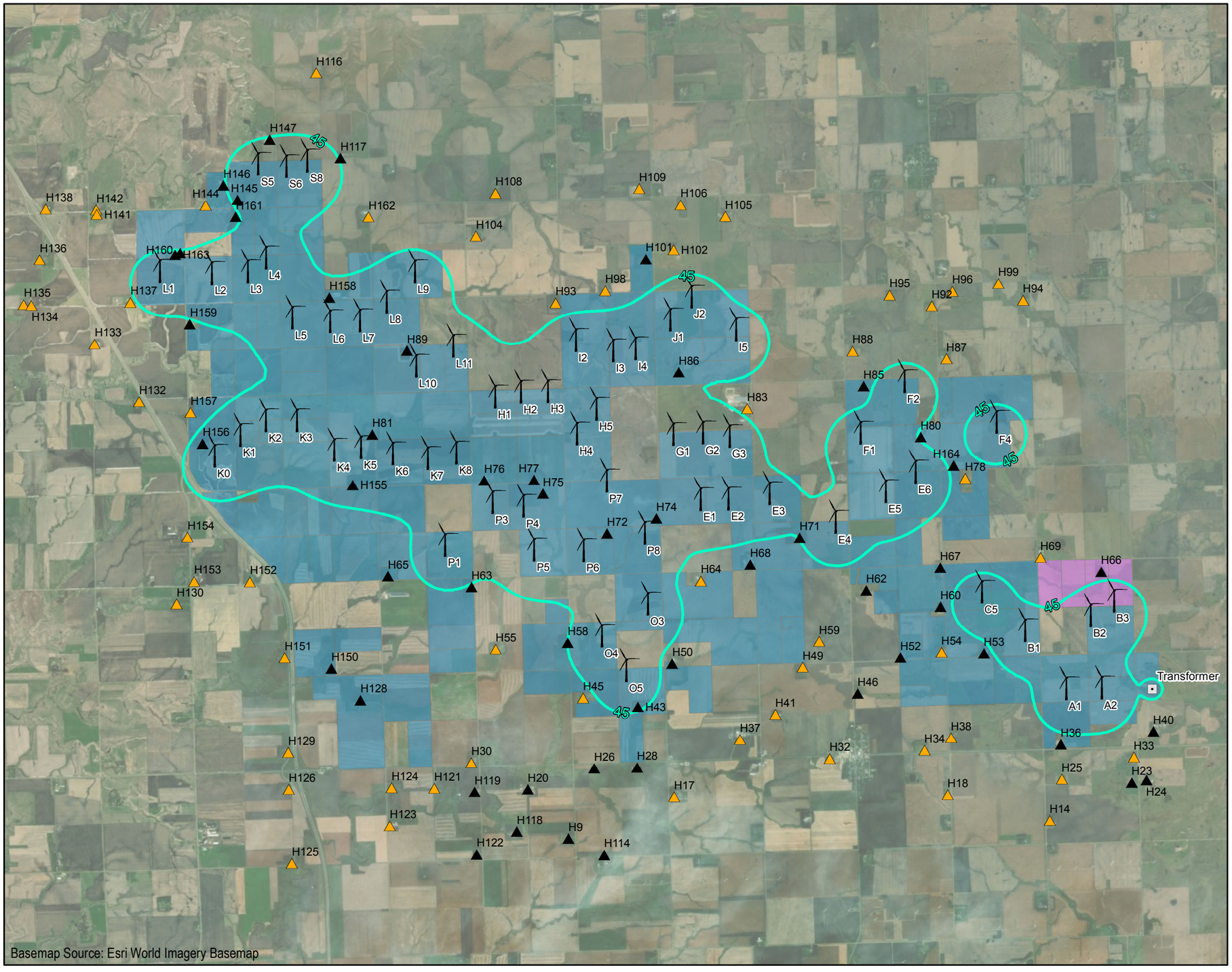
Table A1. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)		
		Mixed Ground Scenario (Figure 1)	Hard Ground Scenario (Figure A-1)	NARUC Scenario (Figure A-2)
Nonparticipating	H133	37	37	34
Participating	H28	37	37	34
Nonparticipating	H116	37	37	34
Participating	H26	37	37	34
Nonparticipating	H49	37	37	34
Nonparticipating	H92	37	37	34
Nonparticipating	H95	37	37	34
Nonparticipating	H109	36	37	33
Nonparticipating	H141	36	37	33
Participating	H23	36	37	33
Nonparticipating	H142	36	36	33
Nonparticipating	H38	36	36	33
Nonparticipating	H153	36	36	33
Participating	H24	36	36	33
Participating	H46	36	36	33
Nonparticipating	H41	36	36	33
Nonparticipating	H37	36	36	33
Nonparticipating	H96	35	36	32
Participating	H150	35	36	32
Nonparticipating	H34	35	35	32
Nonparticipating	H151	35	35	32
Participating	H128	35	35	32
Nonparticipating	H17	35	35	32
Nonparticipating	H130	35	35	32
Participating	H20	34	35	31
Nonparticipating	H30	34	35	32
Nonparticipating	H14	34	34	31
Nonparticipating	H136	34	34	31
Nonparticipating	H32	34	34	31
Nonparticipating	H94	34	34	31
Nonparticipating	H99	34	34	31
Nonparticipating	H134	34	34	31
Nonparticipating	H18	34	34	31
Nonparticipating	H138	34	34	31
Nonparticipating	H135	34	34	31
Participating	H119	33	34	31
Nonparticipating	H121	33	33	30
Participating	H9	33	33	30

Table A1. Modeled Receiver Locations

Receiver Status	Receiver ID	Sound Pressure Level (dBA)		
		Mixed Ground Scenario (Figure 1)	Hard Ground Scenario (Figure A-1)	NARUC Scenario (Figure A-2)
Participating	H118	33	33	30
Nonparticipating	H124	33	33	30
Participating	H114	32	33	30
Nonparticipating	H129	32	33	29
Participating	H122	32	32	29
Nonparticipating	H123	31	32	29
Nonparticipating	H126	31	32	29
Nonparticipating	H139	31	31	28
Nonparticipating	H140	31	31	28
Nonparticipating	H125	30	30	27

Notes:
dBA = decibel (A-weighted scale)
ID = identifier



C:\USERS\GGEE\DOCUMENTS\GIS\BASTACH_PROJECT\TATANKA\MAPFILES\TATANKA_SOUND_041719.MXD GGEE 4/22/2019 12:37:29 PM

LEGEND

Turbine Location

Transformer

Predicted Sound Pressure Level (dBA)

45

Occupied Residence (Participating Status)

Participating

Nonparticipating

Property Agreement Status

Signed

Negotiating Transmission Line Easement

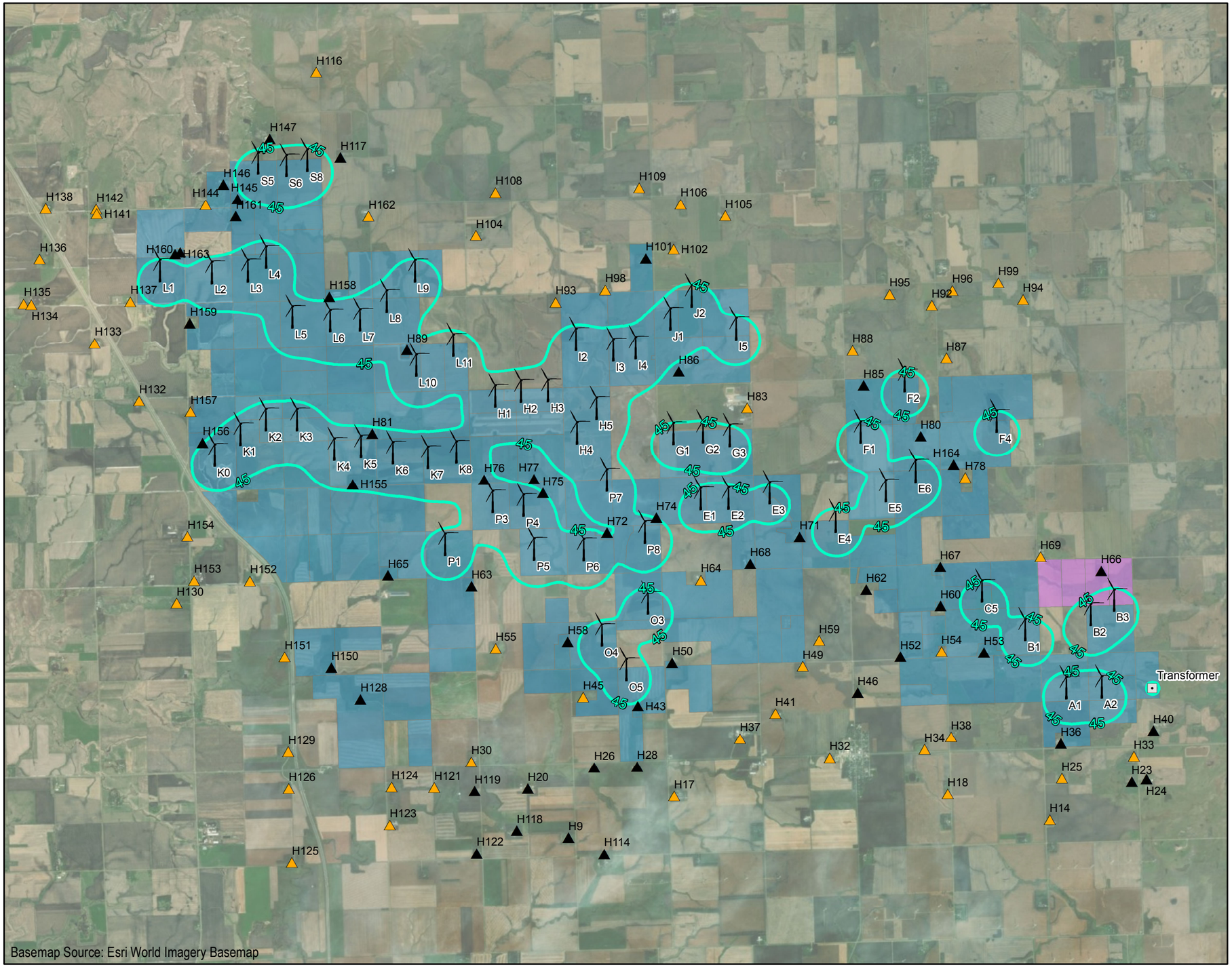
N

0 0.25 0.5 0.75 1 2

Miles

Figure A-1
Predicted Sound Pressure Levels (dBA)
Scenario: Hard Ground
Tatanka Ridge Wind Project

JACOBS



LEGEND

Turbine Location

Transformer

Predicted Sound Pressure Level (dBA)

45

Occupied Residence (Participating Status)

Participating

Nonparticipating

Property Agreement Status

Signed

Negotiating Transmission Line Easement

N

0 0.25 0.5 0.75 1 2

Miles

C:\USERS\GGEE\DOCUMENTS\GIS\BASTACH_PROJECT\TATANKA\MAPFILES\TATANKA_SOUND_041719.MXD GGEE 4/22/2019 12:37:29 PM

Figure A-2
Predicted Sound Pressure Levels (dBA)
Scenario: NARUC
Tatanka Ridge Wind Project

JACOBS

Appendix O

Shadow Flicker Modeling

JACOBS®

Memorandum

2020 SW Fourth AVE, 3rd FLR
Portland, OR 97201
T + 503.235.5000
F + 503.736.2000
www.jacobs.com

Subject	**Tatanka Ridge Wind Project Shadow Flicker Modeling**
Attention	Jesse Bermel/Avangrid Renewables, LLC.
From	Mark Bastasch/Jacobs Engineering Group, Inc.
Date	April 29, 2019

This memorandum provides the predicted duration of shadow flicker for the Tatanka Ridge Wind Project (Project) proposed by Tatanka Ridge Wind, LLC (Tatanka Ridge) a subsidiary of Avangrid Renewables, LLC (Avangrid Renewables). This analysis is based on 62 wind turbine locations (55 primary locations and 7 potential alternate locations). Figure 1 (attached) presents the Project's proposed wind turbine layout and the predicted duration of flicker based on the analysis described herein, as well as the residences that have been identified by Avangrid Renewables. Deuel County's zoning ordinance limits shadow flicker to no more than 30 hours annually at existing residences. Modeling of the Project found that the highest predicted hours of expected shadow flicker per year is 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's proposed wind turbine layout satisfy the Deuel County zoning ordinance requirements.

1. Background

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. The intensity of shadow flicker is defined as "the difference or variation in brightness at a given location in the presence or absence of a shadow" (National Research Council, 2007). The intensity of the shadows cast by moving blades of wind turbines, and thus the perceived intensity of the flickering effect, is determined by the distance of the affected area from the turbine, with the most intense, distinct, and focused shadows occurring closest to the turbine (Department of Energy & Climate Change, 2009). The frequency of shadow flicker is a function of the number of blades making up the wind turbine rotor and rotor speed. Shadow flicker frequency is measured in terms of alternations per second, or hertz (Hz).

There are two kinds of concerns that have been raised about shadow flicker in severe cases. One is that shadow flicker could have the potential to trigger epileptic seizures, and the other is that shadow flicker could become a source of annoyance to residents living near wind turbines. The Epilepsy Foundation notes that for a small minority (about 3 percent) of the 3 million people in the United States who are affected by epilepsy, there is a potential for epileptic seizures to be triggered by flashing light. These seizures have the potential to be triggered when the light flashes are in the range of 5 to 30 Hz. Because the frequency of the shadow flicker created by modern wind turbines is below this range of (typically less than 1.0 Hz), the shadow flicker effects created by wind turbines do not have the potential to trigger epileptic seizures (Epilepsy Foundation, 2008).

The issue of annoyance is more subjective and addressed by the limits established in the Deuel County zoning ordinance. There could be cases in which shadow flicker cast on residences located very close to

wind turbines could be enough of a distraction for residents to be considered an annoyance. The Project has mitigated this risk by selecting turbine locations that comply with the Deuel County requirements.

2. Regulatory Requirements and Modeling Methods

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 for the proposed Project was conducted using the SHADOW calculation module of the WindPRO 3.2 software. WindPRO is a comprehensive software package developed for the design, development, and assessment of wind farm projects, as well as for the evaluation of energy, environmental, visual, electrical, and economic effects of wind energy projects. To calculate shadow flicker levels at nearby residences and other structures, referred to as receptors, the WindPRO SHADOW calculation module takes into account the location of each receptor, the orientation of each side of the receptor, the location of each wind turbine, turbine hub height, turbine rotor diameter, turbine blade width, latitude and longitude, elevation data of the specific analysis area, and data on the sun's path through the sky on each day of the year (EMD International A/S [EMD], 2008). The locations of proposed wind turbines as well as the residences were provided by Avangrid Renewables for the analysis. The shadow flicker model made use of topographic data to account for the minor elevation differences and topographic features potentially in the line of sight when turbines are viewed from a receptor. For the area within the Project and its vicinity, the U.S. National Elevation Dataset incorporated in WindPro was used.

The primary wind turbine specifications that influence shadow flicker are the hub height, blade length, and blade width. Avangrid Renewables provided this information for the General Electric turbines. The WindPRO SHADOW calculation model was run based on the project layout identified in Table 1.

Table 1. Modeled Turbine Locations

Source ID	Turbine Manufacturer	Rotor Diameter (m)	Hub Height (m)	Coordinates		
				Easting (m)	Northing (m)	Z (m)
A1	GE	127	88.6	690,799	4,939,136	585
A2	GE	127	88.6	691,407	4,939,152	580
B1	GE	127	88.6	690,097	4,940,133	590
B2	GE	127	88.6	691,218	4,940,385	568
B3	GE	127	88.6	691,615	4,940,639	571
C5	GE	127	88.6	689,357	4,940,791	590
E1	GE	116	90	684,544	4,942,375	613
E2	GE	116	90	685,022	4,942,384	609
E3	GE	116	90	685,724	4,942,474	611
E4	GE	127	88.6	686,854	4,941,987	605
E5	GE	127	88.6	687,711	4,942,510	592
E6	GE	127	88.6	688,223	4,942,843	590
F1	GE	127	88.6	687,280	4,943,515	587
F2	GE	127	88.6	688,033	4,944,395	582
F4	GE	127	88.6	689,608	4,943,698	570
G1	GE	116	90	684,078	4,943,490	610
G2	GE	116	90	684,583	4,943,517	612
G3	GE	116	90	685,040	4,943,455	612
H1	GE	127	88.6	681,030	4,944,127	608

Table 1. Modeled Turbine Locations

Source ID	Turbine Manufacturer	Rotor Diameter (m)	Hub Height (m)	Coordinates		
				Easting (m)	Northing (m)	Z (m)
H2	GE	127	88.6	681,471	4,944,211	613
H3	GE	127	88.6	681,931	4,944,224	615
H4	GE	127	88.6	682,427	4,943,501	612
H5	GE	127	88.6	682,765	4,943,922	615
I2	GE	127	88.6	682,410	4,945,098	609
I3	GE	127	88.6	683,048	4,944,921	609
I4	GE	127	88.6	683,432	4,944,956	609
I5	GE	127	88.6	685,151	4,945,281	598
J1	GE	127	88.6	684,023	4,945,449	601
J2	GE	127	88.6	684,389	4,945,846	593
K0	GE	127	88.6	676,230	4,943,117	580
K1	GE	127	88.6	676,670	4,943,472	588
K2	GE	127	88.6	677,108	4,943,724	589
K3	GE	127	88.6	677,637	4,943,726	590
K4	GE	127	88.6	678,278	4,943,221	594
K5	GE	127	88.6	678,736	4,943,263	595
K6	GE	127	88.6	679,281	4,943,157	599
K7	GE	127	88.6	679,879	4,943,079	601
K8	GE	127	88.6	680,365	4,943,168	600
L1	GE	127	88.6	675,295	4,946,281	588
L10	GE	127	88.6	679,680	4,944,655	603
L11	GE	127	88.6	680,314	4,944,999	613
L2	GE	127	88.6	676,183	4,946,247	591
L3	GE	127	88.6	676,798	4,946,277	598
L4	GE	127	88.6	677,113	4,946,511	583
L5	GE	127	88.6	677,560	4,945,484	597
L6	GE	127	88.6	678,208	4,945,420	599
L7	GE	127	88.6	678,716	4,945,435	605
L8	GE	127	88.6	679,174	4,945,757	606
L9	GE	127	88.6	679,657	4,946,274	592
O3	GE	127	88.6	683,641	4,940,587	601
O4	GE	127	88.6	682,854	4,940,037	590
O5	GE	127	88.6	683,275	4,939,446	591
P1	GE	127	88.6	680,174	4,941,593	588
P3	GE	127	88.6	680,988	4,942,323	603
P4	GE	127	88.6	681,515	4,942,260	603
P5	GE	127	88.6	681,693	4,941,514	597
P6	GE	127	88.6	682,544	4,941,503	597

Table 1. Modeled Turbine Locations

Source ID	Turbine Manufacturer	Rotor Diameter (m)	Hub Height (m)	Coordinates		
				Easting (m)	Northing (m)	Z (m)
P7	GE	127	88.6	682,938	4,942,691	609
P8	GE	127	88.6	683,589	4,941,798	606
S5	GE	127	88.6	676,976	4,948,113	591
S6	GE	127	88.6	677,460	4,948,073	597
S8	GE	127	88.6	677,815	4,948,173	594

Notes:
GE = General Electric
ID = identifier
m = meter(s)

As the sun approaches the horizon, sunshine becomes less intense, and, therefore, the shadow influence is reduced. To take this phenomenon into account, the standard practice in shadow flicker analysis is to calculate shadow flicker for only the times when the sun is at an angle of 3 or more degrees above the horizon (EMD, 2008; Osten and Pahlke, 1998). In conducting this analysis, the 3-degree threshold was observed.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. The intensity of shadow flicker tapers off with increasing distance from the turbine. Generally, shadow flicker is most intense and noticeable within 1,000 meters (3,274 feet) of the turbine. With increased distance from the turbine, the shadow flickering becomes less perceptible. Research has established that the threshold at which shadow flicker is no longer pronounced is the point at which less than 20 percent of the sun would be covered by the blade (EMD, 2008; Osten and Pahlke, 1998). The distance threshold defining the area within which 20 percent or more of the sun is covered is determined by WindPRO based on the width of the blades.

The orientation of each receptor was set on “greenhouse mode” for the model, which makes the assumption that the receptor has windows on all of its sides and, therefore, would be affected by shadow flicker that falls on any side of the structure; the “greenhouse mode” represents a worst-case indoor scenario for each receptor.

An important variable that the WindPRO Shadow calculation model takes into account is the probable hours when the sunny conditions required for shadows to be created will be present in the Project area. To generate the data that the model requires to account for hours of sunshine, Jacobs reviewed the meteorological data from nearby weather stations to identify the available data on cloud coverage and used it to calculate the percentage of sunny days by month. The most representative meteorological station where the appropriate data are collected is located at the Watertown Regional Airport, located approximately 30 miles northwest of the Project’s northern edge. To calculate the monthly probabilities of sunshine, hourly observations of cloud cover were obtained from the National Weather Service (NWS) Watertown Regional Airport meteorological monitoring station (Weather-Bureau-Army-Navy #14946).

The monthly probabilities of sunshine were calculated using hourly data from the 2007 through 2018. The AERMET meteorological data processor, developed by the U.S. Environmental Protection Agency to read and extract parameters from NWS data and process for the purposes of air dispersion modeling, was used to calculate the monthly probabilities of sunshine. For this analysis, AERMET (Version 18181) extracted the fraction of cloud cover for each hour and calculated the convective mixing height based on the station latitude and time zone. The total daytime hours for each month were determined based on the convective mixing height, which is generated only during daytime hours. For each valid hour, a cloud cover of 0.7 and below was considered sunny. The total number of sunny hours (or sun hours) was divided by the total number of valid daytime hours in the month to determine each month’s sunshine

probability. The monthly sunshine probabilities derived through this analysis and used in calculating the Project's adjusted shadow flicker effects are summarized in Table 1.

Table 2. Average Sunshine Probability per Month (Recorded Sun Hours/Possible Sun Hours)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.56	0.58	0.55	0.63	0.66	0.76	0.87	0.80	0.75	0.64	0.62	0.50

Based on the analysis of the available cloud cover data, the sun would be unobstructed by clouds long enough to have the potential to permit shadow flicker effects to be created anywhere from 50 to 87 percent of the time during daylight hours on a monthly basis. Meteorological data were provided by Avangrid Renewables to incorporate the annual operational hours for each wind direction into the shadow flicker analysis. The wind direction determines how much of the time the blades are turned in a direction that would cast shadows on the receptors being evaluated. These statistics are summarized in Table 3:

Table 3. Average Annual Operational Hours per Wind Direction

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW
814	564	389	383	500	654	1,197	844	542	739	874	805

Other factors that could also affect the total amount of predicted shadow flicker, but were not taken into account in the modeling include the following:

- Presence of haze or particulate matter in the air that tends to reduce the intensity of light and reduce distances at which shadows can be cast.
- Potential structures and vegetation located between receptors and the turbines, which would block shadows created by the rotating turbine blades and thus prevent shadow flicker from occurring at receptors.
- The model assumes that the receptors are in the "greenhouse mode," in which the receptor is assumed to be all windows—a worst-case scenario. Receptors normally have much less window than wall space on any given side.

2.1.1 Conclusions

The shadow flicker modeling results for the all identified receptors are presented in tabular format in Table 4. These results present the expected annual hours of shadow flicker for 62 wind turbines which is 7 more than the Project's stated maximum buildout of 55 locations. As turbine technology continues to evolve, Tatanka Ridge intends to obtain multiple bids for the Project and evaluate multiple technologies. The final turbine locations will be selected based on a subset of the 62 locations identified in this analysis. These results are based on the historical average meteorological conditions identified in this analysis. All receptors are identified with an identification that corresponds to the receptor locations labeled in Figure 1. The information provided on Figure 1 consists of butterfly diagrams that indicate the 30 hour per year potential shadow flicker contour around each turbine, and the locations of the receptors in the Project area in relationship to this contour. A review of the annual shadow flicker exposure data indicates that the receptors with the potential to experience shadow flicker effects could experience from 1 minute up to approximately 28 hours per year of shadow flickering. These results do not exceed the 30 hours per year limit established by Deuel County.

Table 4. Expected Annual Hours of Flicker

Receiver ID	Receiver Status	Easting [m]	Northing [m]	Z [m]	Expected Shadow Hours per Year [h/year]
H86	Participating	684,161	4,944,755	613	28:29

Table 4. Expected Annual Hours of Flicker

Receiver ID	Receiver Status	Easting [m]	Northing [m]	Z [m]	Expected Shadow Hours per Year [h/year]
H89	Participating	679,515	4,945,123	609	27:24
H75	Participating	681,840	4,942,678	602	27:03
H146	Participating	676,373	4,947,953	576	25:10
H76	Participating	680,833	4,942,902	605	22:32
H155	Participating	678,585	4,942,822	596	21:45
H81	Participating	678,919	4,943,688	596	20:59
H72	Participating	682,934	4,941,994	598	20:19
H156	Participating	676,014	4,943,529	582	20:16
H74	Participating	683,780	4,942,251	611	17:51
H145	Participating	676,613	4,947,704	570	17:44
H158	Participating	678,182	4,946,033	605	16:57
H45	Nonparticipating	682,524	4,939,180	579	14:51
H58	Participating	682,263	4,940,123	584	14:27
H71	Participating	686,229	4,941,921	610	14:17
H163	Participating	675,547	4,946,765	598	13:45
H117	Participating	678,375	4,948,421	601	13:05
H147	Participating	677,166	4,948,738	583	12:11
H87	Nonparticipating	688,741	4,944,987	571	11:37
H53	Participating	689,381	4,939,944	596	11:18
H144	Nonparticipating	676,071	4,947,608	563	11:16
H77	Participating	681,688	4,942,911	603	10:51
H60	Participating	688,637	4,940,736	595	10:05
H157	Nonparticipating	675,808	4,944,069	583	9:39
H83	Nonparticipating	685,334	4,944,133	605	9:09
H85	Participating	687,326	4,944,518	588	8:57
H137	Nonparticipating	674,779	4,945,951	583	8:15
H160	Participating	675,633	4,946,794	595	7:55
H67	Participating	688,636	4,941,413	593	7:45
H65	Participating	679,189	4,941,266	567	7:09
H78	Nonparticipating	689,062	4,942,941	575	7:02
H50	Participating	684,050	4,939,765	596	6:15
H88	Nonparticipating	687,136	4,945,116	586	6:14
H63	Participating	680,616	4,941,080	594	5:36
H64	Nonparticipating	684,540	4,941,185	611	4:34
H80	Participating	688,300	4,943,646	587	3:49
H43	Participating	683,463	4,939,028	585	0:00
H161	Participating	676,584	4,947,413	567	0:00
H159	Participating	675,799	4,945,577	583	0:00
H68	Participating	685,385	4,941,463	610	0:00

Table 4. Expected Annual Hours of Flicker

Receiver ID	Receiver Status	Easting [m]	Northing [m]	Z [m]	Expected Shadow Hours per Year [h/year]
H98	Nonparticipating	682,904	4,946,155	604	0:00
H66	Participating	691,388	4,941,342	558	0:00
H93	Nonparticipating	682,055	4,945,939	607	0:00
H36	Participating	690,696	4,938,383	593	0:00
H162	Nonparticipating	678,852	4,947,413	594	0:00
H101	Participating	683,599	4,946,691	587	0:00
H102	Nonparticipating	684,074	4,946,851	589	0:00
H62	Participating	687,368	4,941,026	611	0:00
H69	Nonparticipating	690,352	4,941,587	567	0:00
H54	Nonparticipating	688,658	4,939,959	592	0:00
H104	Nonparticipating	680,692	4,947,086	607	0:00
H55	Nonparticipating	681,031	4,940,013	583	0:00
H40	Participating	692,283	4,938,611	572	0:00
H33	Nonparticipating	691,948	4,938,171	579	0:00
H154	Nonparticipating	675,757	4,941,934	568	0:00
H132	Nonparticipating	674,929	4,944,253	575	0:00
H59	Nonparticipating	686,562	4,940,149	606	0:00
H25	Nonparticipating	690,715	4,937,792	598	0:00
H52	Participating	687,955	4,939,871	604	0:00
H105	Nonparticipating	684,957	4,947,425	580	0:00
H106	Nonparticipating	684,194	4,947,619	592	0:00
H108	Nonparticipating	681,028	4,947,822	598	0:00
H49	Nonparticipating	686,281	4,939,710	611	0:00
H28	Participating	683,448	4,937,988	575	0:00
H152	Nonparticipating	676,826	4,941,169	561	0:00
H133	Nonparticipating	674,171	4,945,237	575	0:00
H26	Participating	682,715	4,937,976	568	0:00
H116	Nonparticipating	677,958	4,949,878	587	0:00
H92	Nonparticipating	688,489	4,945,892	565	0:00
H95	Nonparticipating	687,770	4,946,076	572	0:00
H109	Nonparticipating	683,484	4,947,898	597	0:00
H141	Nonparticipating	674,202	4,947,455	582	0:00
H23	Participating	691,912	4,937,732	593	0:00
H41	Nonparticipating	685,817	4,938,898	610	0:00
H37	Nonparticipating	685,209	4,938,467	601	0:00
H142	Nonparticipating	674,195	4,947,534	582	0:00
H38	Nonparticipating	688,821	4,938,498	605	0:00
H46	Participating	687,223	4,939,256	604	0:00
H153	Nonparticipating	675,873	4,941,177	555	0:00

Table 4. Expected Annual Hours of Flicker

Receiver ID	Receiver Status	Easting [m]	Northing [m]	Z [m]	Expected Shadow Hours per Year [h/year]
H24	Participating	692,163	4,937,775	591	0:00
H96	Nonparticipating	688,841	4,946,145	564	0:00
H150	Participating	678,221	4,939,683	550	0:00
H17	Nonparticipating	684,084	4,937,488	592	0:00
H34	Nonparticipating	688,367	4,938,286	602	0:00
H128	Participating	678,716	4,939,141	554	0:00
H151	Nonparticipating	677,418	4,939,868	548	0:00
H20	Participating	681,578	4,937,615	564	0:00
H30	Nonparticipating	680,611	4,938,073	568	0:00
H130	Nonparticipating	675,574	4,940,786	551	0:00
H32	Nonparticipating	686,745	4,938,142	606	0:00
H14	Nonparticipating	690,508	4,937,083	599	0:00
H136	Nonparticipating	673,228	4,946,679	590	0:00
H94	Nonparticipating	690,052	4,945,991	558	0:00
H99	Nonparticipating	689,630	4,946,277	558	0:00
H134	Nonparticipating	673,086	4,945,901	576	0:00
H18	Nonparticipating	688,764	4,937,521	607	0:00
H119	Participating	680,671	4,937,573	563	0:00
H138	Nonparticipating	673,333	4,947,545	582	0:00
H135	Nonparticipating	672,956	4,945,917	575	0:00
H121	Nonparticipating	679,979	4,937,635	563	0:00
H9	Participating	682,277	4,936,774	573	0:00
H118	Participating	681,391	4,936,894	572	0:00
H114	Participating	682,887	4,936,492	579	0:00
H124	Nonparticipating	679,249	4,937,641	557	0:00
H129	Nonparticipating	677,481	4,938,248	549	0:00
H122	Participating	680,705	4,936,501	565	0:00
H123	Nonparticipating	679,220	4,936,990	564	0:00
H126	Nonparticipating	677,489	4,937,617	550	0:00
H139	Nonparticipating	672,465	4,948,293	563	0:00
H140	Nonparticipating	672,468	4,948,419	564	0:00
H125	Nonparticipating	677,541	4,936,351	547	0:00

Notes:
h/year = hours per year
ID = identifier
m = meter(s)

3. References

Department of Energy & Climate Change. 2009. *Onshore Wind: Shadow Flicker*. http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/planning/on_off_wind/shadow_flicker/shadow_flicker.aspx.

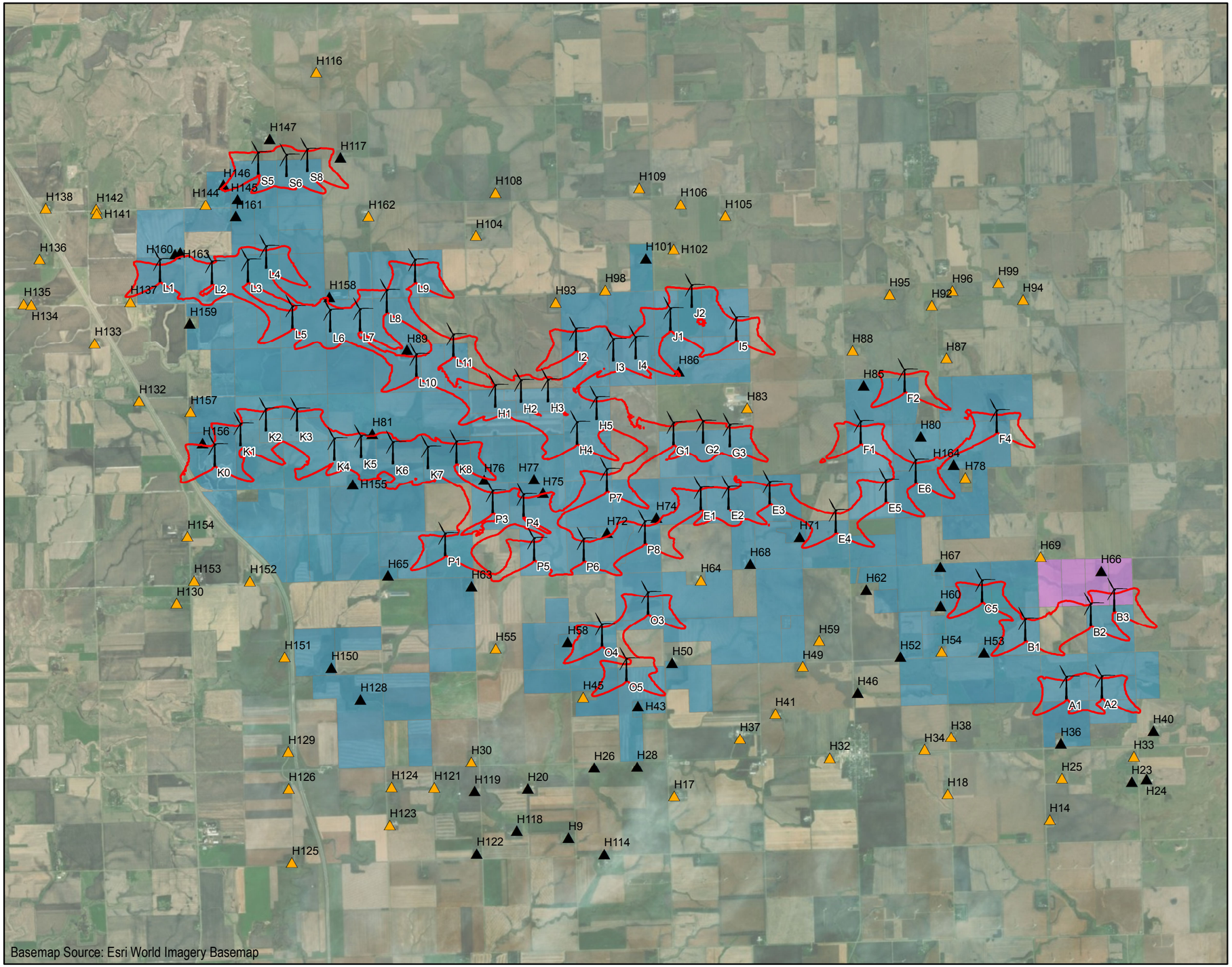
EMD International A/S (EMD). 2008. *WindPRO 2.6 User's Guide*. First Edition. Pages 8–9 and 254–263. January.

Epilepsy Foundation. 2008. *Photosensitivity and Epilepsy*. http://www.epilepsyfoundation.org/about/photosensitivity/index.cfm.

National Research Council. 2007. *Environmental Impacts of Wind-Energy Projects.* National Academies Press.

Osten, Tjado, and Thomas Pahlke. 1998. "Schattenwurf von Windenergieanlagen: Wird die Gebraeuschabstrahlung der MW-Anlagen in den Schatten Gestellt? (Shadow Impact on the Surrounding of Wind Turbines)." *DEWI Magazin*, Nr. 13. Pp. 6–12. August.

Figure



LEGEND

Turbine Location

Annual Hours of Shadow Flicker (30 hours)

Residence (Participating Status)

Participating

Nonparticipating

Property Agreement Status

Signed

Negotiating Transmission Line Easement

N

0 0.25 0.5 0.75 1 2

Miles

Figure 1
Predicted Shadow Flicker
Tatanka Ridge Wind Project

JACOBS

C:\USERS\GGEE\DOCUMENTS\GIS\BASTACH_PROJECT\TATANKA\MAPFILES\TATANKA_FLICKER_041719.MXD GGEE 4/24/2019 3:41:09 PM

Appendix P

Deuel County Ordinance

ORDINANCE B2004-01, AN ORDINANCE ESTABLISHING ZONING REGULATIONS FOR DEUEL COUNTY, SOUTH DAKOTA, AND PROVIDING FOR THE ADMINISTRATION, ENFORCEMENT, AND AMENDMENT THEREOF, IN ACCORDANCE WITH THE PROVISIONS OF CHAPTERS 11-2, 1967 SDCL, AND AMENDMENTS THEREOF, AND FOR THE REPEAL OF ALL RESOLUTIONS AND ORDINANCES IN CONFLICT THEREWITH.

WHEREAS, the Deuel County, South Dakota, Board of County Commissioners, hereinafter referred to as the Board of County Commissioners, deems it necessary, for the purpose of promoting the health, safety, and the general welfare of the County, to enact a zoning regulation and to provide for its administration, and

WHEREAS, the Board of County Commissioners have appointed a County Planning Commission, hereinafter referred to as the Planning Commission, to recommend the district boundaries and to recommend appropriate regulations to be enforced therein, and

WHEREAS, the Planning Commission has divided Deuel County into districts, and has established by reference to maps the boundaries of said districts for administration and interpretation; has provided for definitions and for amendments to this regulation; has provided for the enforcement; prescribed penalties for violation of provisions; has provided for building permits within the districts; has provided for invalidity of a part and for repeal of regulation in conflict herewith; and has prepared regulations pertaining to such districts in accordance with the county comprehensive plan and with the purpose to protect the tax base, to guide the physical development of the county, to encourage the distribution of population or mode of land utilization that will facilitate the economical and adequate provisions of transportation, roads, water supply, drainage, sanitation, education, recreation, or other public requirements, to conserve and develop natural resources, and

WHEREAS, the Planning Commission has given reasonable consideration, among other things, to the character of the districts and their peculiar suitability for particular uses, and

WHEREAS, the Planning Commission has given due public notice to a hearing and has held such public hearing and has made a preliminary report and submitted it to the Board of County Commissioners, and

WHEREAS, the Board of County Commissioners has given due public notice to a hearing relating to zoning districts, regulations, and restrictions, and has held such public hearings, and

WHEREAS, all requirements of SDCL 11-2, 1967, with regard to the preparation of this ordinance and subsequent action of the Board of County Commissioners, has been met, and

WHEREAS, copies of said zoning ordinance and zoning map have been filed with the Deuel County Auditor for public inspection and review during regular business hours, and

WHEREAS, all ordinances or parts of ordinances in conflict herewith are hereby expressly repealed;

THEREFORE BE IT RESOLVED that the Deuel County Zoning Ordinance is hereby adopted by the Board of County Commissioners, Deuel County, South Dakota.

Adopted this 6th day of July, 2004.

_____
Chairman
Deuel County Board of County Commissioners

ATTEST:

_____
Deuel County Auditor

ARTICLE I

SHORT TITLE AND APPLICATION

Section 101 Title. This regulation may be known and may be cited and referred to as the "Deuel County Zoning Ordinance" to the same effect as if the full title were stated.

Section 102. Jurisdiction. Pursuant to SDCL Chapter 11-2, 1967, as amended, the provision of this Ordinance shall apply within the unincorporated areas of Deuel County, South Dakota, as established on the map entitled "The Official Zoning Map of Deuel County, South Dakota."

Section 103. Provisions of Ordinance Declared to be Minimum Requirements. In their interpretation and application, the provisions of this Ordinance shall be held to be minimum requirements, adopted for the promotion of the public health, safety, morals, or general welfare. Wherever the requirements of this Ordinance are at variance with the requirements of any other lawfully adopted rules, regulations, ordinances, deed restrictions, or covenants, the most restrictive or that imposing the higher standards, shall govern.

Section 104. Purpose

These regulations have been based upon the Deuel County Comprehensive Land Use Plan adopted by the Board of County Commissioners, and are in conformance with Chapter 11-2 of the South Dakota Compiled Laws. These regulations are designed to carry out the goals and objectives of the plan, but especially to lessen congestion in the streets; to secure safety from fire, panic and other dangers; to promote health and the general welfare; to provide adequate light and air; to prevent the overcrowding of land; to avoid undue concentration or scattering of population; and to encourage a distribution of population or mode of land utilization that will facilitate the economical and adequate provision of transportation, water, drainage, sewerage, schools, parks, or other public requirements.

These regulations have been made with reasonable consideration to the character and intensity of the various land uses and the need for public facilities and services that would develop from those uses. These regulations are necessary for the best physical development of the county. The regulations are intended to preserve and protect existing property uses and values against adverse or unharmonious adjacent uses by zoning all unincorporated land except those areas where joint zoning jurisdiction has been granted to a municipality.

ARTICLE II

DEFINITIONS

Section 201. For the purpose of this Ordinance, certain terms and words are hereby defined. Words used in the present tense shall include the future; the singular number shall include the plural and the plural the singular; the word "building" shall include the word "structure", the word "shall" is mandatory and not discretionary; the word may is permissive; the word person includes a firm, association, organization, partnership, trust, company or corporation, as well as, an individual; the word lot includes the word plat or parcel; and the words used or occupied include the words intended, designed, or arranged to be used or occupied. Any word not herein defined shall be as defined in any recognized Standard English dictionary.

Section 202. Accessory Buildings and Uses. A subordinate use which is incidental to that of the main building or to the main use of the premises.

Section 203. Adult Amusement or Entertainment Establishment. Any use which has as part of its operations amusement or entertainment which is distinguished or characterized by an emphasis on material depicting, describing, or relating to “specified sexual activities” or “specified anatomical areas” as herein defined, or which features topless dancers, exotic dancers, strippers, male or female impersonators, or similar entertainment.

Section 204. Adult Bookstores. An establishment having as a substantial or significant portion of its stock and trade, books, magazines, and other periodicals which are distinguished or characterized by their emphasis on matters depicting, describing, or relating to “specified sexual activities” or “specified anatomical areas” as herein defined, or an establishment with a segment or section devoted to the sale or display of such materials.

Section 205. Adult Mini-motion Picture Theater. An enclosed building with a capacity for less than fifty (50) persons used for presenting material for observation by patrons and which excludes minors by virtue of age.

Section 206. Adult Motion Picture Theater. An enclosed building used for presenting material distinguished or characterized by an emphasis on matter depicting, describing or relating to “specified sexual activities” or “specified anatomical areas” as herein defined, for observation by patrons therein.

Section 207. Adult Photo Studio. An establishment which, on payment of a fee, provides photographic equipment and/or models for the purpose of photographing “specified anatomical areas”, as herein defined.

Section 208. Adult use. The term “adult use” shall include adult amusement or entertainment establishment, adult bookstores, adult mini motion picture theaters, adult motion picture theaters, and adult photo studios.

Section 209. Agriculture. The use of land for agricultural purposes including farming, dairying, raising, breeding, or management of livestock, poultry, or honey bees, truck gardening, forestry, horticulture, floriculture, viticulture, and the necessary accessory uses for packaging, treating or storing the produce providing that the operation of any such accessory use shall be secondary to the normal agricultural activities. This definition shall not include intensive agricultural activities such as concentrated animal feeding operations and agribusiness activities.

Section 2.10. Airport. A place where aircraft can land and takeoff, usually equipped with hangers, facilities for refueling and repair, and various accommodations for passengers, including heliports.

Section 211. Animal Husbandry. The dairying, raising of livestock, breeding or keeping of animals, fowl or birds as a business for gainful occupation.

Section 212. Animal Manure. Poultry, livestock, or other animal excreta or mixture of excreta with feed, bedding or other materials.

Section 213. Animal Unit. See Article XIII.

Section 214. Animal Waste, Incorporated. Animal waste applied to the land surface and mechanically mixed into the soil within 24 hours.

Section 215 Animal Waste, Injected. Animal waste injected or tilled into the soil at the time of application.

Section 216 Animal Waste, Surface Applied**.** Animal waste applied to the land surface without benefit of incorporation or injection. This shall not include the use of animal waste in irrigation waters.

Section 217. Applicant**.** An individual, a corporation, a group of individuals, partnership, joint venture, owners, or any other business entity having charge or control of one or more concentrated animal feeding operations.

Section 218. Basement. A basement has more than one-half (1/2) of its height below grade.

Section 219. Bed and Breakfast (B & B's). A private single-family residence, which is used to provide, limited meals and temporary accommodations for a charge to the public. Such establishments should be located where there will be minimal impact on surrounding properties and should comply with the following conditions:

1. They shall be in compliance with applicable state laws including registration with the South Dakota Department of Health, maintaining a guest list, and providing a smoke detector in each sleeping room.

2. Accessory use signs shall be based on similar requirements for a home occupation permit and shall not be more than two (2) square foot in area.

3. Such uses shall be an incidental use with an owner occupied principal dwelling structure provided that not more than four bedrooms in such dwelling structure shall be used for such purpose.

4. The length of stay shall not exceed fourteen (14) days during any one hundred twenty--(120) day consecutive period.

5. Meals shall be limited to breakfast, which is prepared in a common facility (household kitchen). Meals may be served only to overnight registered guests and cooking is not permitted in the sleeping rooms.

6. The building shall meet all building codes and zoning requirements. A site plan showing the location of guest parking spaces and floor plan showing a location of the sleeping rooms, lavatories, and bathing facilities, and kitchen shall be submitted with application.

Section 220. Board of County Commissioners. The governing body of Deuel County.

Section 221. Building. Any structure designed for the support, shelter and protection of persons, animals, or property.

Section 222. Buildings, Height of. The vertical distance from the grade to the highest point of the coping of a flat roof or to the deck line of a mansard roof, or to the mean height level between the eaves and ridge for gable, hip and gambrel roofs.

Section 223. Campground - Shall mean a plot of ground for public use upon which two or more campsites are located, established, maintained, advertised, or held out to the public, to be a place where camping units an be located and occupied as temporary living quarters. Campgrounds for tent trailers and recreational vehicles should be sited with consideration for access to the property. The campground should be designed to minimize the impact from adjacent major thoroughfares.

Section 224. Change in Operation. Change in operation means a cumulative increase of more than 99 animal units, after June 3, 1997, which are confined at an unpermitted concentrated animal feeding operation.

Section 225. Concentrated Animal Feeding Operation. A Concentrated Animal Feeding Operation is defined as a lot, yard, corral, building or other area where animals have been, are, or will be stabled or confined for a total of 45 days or more during any 12-month period, and where crops, vegetation, forage growth, or post harvest residues are not sustained over any portion of the lot or facility. Two or more animal feeding operations under common ownership are single animal operation if they adjoin each other, or if they use a common area, or if they use a common area or system for disposal of manure.

Section 226. Comprehensive Plan. The adopted long-range plan intended to guide the growth and development of Deuel County.

Section 227. Contractor Shops and Yards. Those facilities to include structures and land areas where the outdoor storage of equipment and supplies used for various types of construction are stored. Examples of equipment and supplies include but are not limited to the following – road construction, building construction, gravel operations, and general contracting services.

Section 228. District, Zoning. A section or sections of the County for which regulations governing the use of buildings and premises, the height of buildings, the size of yards, and the intensity of use are uniform.

Section 229. Domestic Sanitary Sewage Treatment Facility. Shall mean the structures equipment and processes required to collect, carry away, and treat and dispose of domestic wastewater, industrial wastes, and or sludge.

Section 230. Dwelling. Any building, including seasonal housing structures, or a portion thereof, which is designed and used exclusively for residential purposes. This definition does not include a mobile home or manufactured home.

Section 231. Dwelling, Farm. Any dwelling farmer owned or occupied by the farm owners, operators, tenants, or seasonal or year-around hired workers.

Section 232. Dwelling, Single-Family. A building occupied exclusively by one (1) family.

Section 233. Dwelling, Multiple. A building occupied by two (2) or more families.

Section 234. Dwelling Unit. One (1) or more rooms, containing sleeping quarters, in a dwelling occupied as separate living quarters by a single family.

Section 235. Existing Farmstead. An existing farmstead shall include a livable house occupied by the owner or tenant within the last three (3) years and shall have been existing on the site for at least five (5) years and the site shall have been used in the past as a farmstead for normal farming operation. The Planning Commission may consider defining an identifiable parcel as an existing farmstead if the proposed site meets the following criterion:

1. Evidence that the proposed site was once used for human habitation. This may be determined by existence of buildings/foundations and/or an established shelterbelt.

2. Information regarding the location of flood plain, access to roads and utilities, and other appropriate site information may be considered by the Planning Commission in determining the suitability of the parcel for development.

Section 236. Extended Home Occupation. See Section 1210.

Section 237. Family. One (1) or more persons related by blood, marriage, or adoption occupying a dwelling unit as a single household unit. A family shall not include more than three (3) adults who are unrelated by blood or law. This definition shall not include foster families as regulated by the State of South Dakota.

Section 238. Farm. An area with or without family dwelling which is used for the growing of the usual farm products, such as vegetables, fruit, trees and grain, and their storage on the area, as well as for the raising, feeding, or breeding thereon of the usual farm poultry and farm animals, such as horses, cattle, sheep and swine. The term "farming" includes the operating of such an area for one or more of the above uses, including dairy farms with the necessary accessory uses for treating or storing the produce; provided, however, that the operation of such accessory uses shall be secondary to that of the normal farming activities.

Section 239. Fence. A structure used as a boundary, screen, separation, means of privacy, protection or confinement, and is constructed of wood, plastic, metal, wire mesh, masonry or other similar material and is used as a barrier of some sort.

Section 240. Frontage. All the property on one (1) side of a street or road.

Section 241. Game Lodge. A building or group of two (2) or more detached, or semi-detached, or attached buildings occupied or used as a temporary abiding place of sportsmen, hunters and fishermen, who are lodged with or without meals, and in which there are sleeping quarters.

Section 242. Garage, Private. An accessory building used for the storage of not more than four (4) vehicles owned and used by the occupant of the building to which it is necessary. Vehicles include cars, pickups, and boats.

Section 243. Group Home. A supervised living or counseling arrangement in a family home context providing for the 24 hour care of children or adults.

Section 244. Home Occupation. See Section 1209.

Section 245. Horticultural services. Commercial services which are oriented to support the science or practical application of the cultivation of fruits, vegetables, flowers, and plants.

Section 246. Junkyards/Salvage Yards. The use of more than one thousand (1,000) square feet of any land, building, or structure, for commercial purposes, where waste, discarded materials such as scrap metals, used building materials, used lumber, used glass, discarded vehicles, paper, rags, rubber, cordage, barrels, etc., are stored.

Section 247. Kennel. Any premise or portion thereon where more than five (5) dogs, cats, or other household pets are raised, trained, boarded, harbored, or kept for remuneration. Veterinary clinics, animal hospitals and animal shelters are specifically excluded.

Section 248. Lot, Buildable.

1. A parcel of land occupied or intended for occupancy by a use permitted in this Ordinance, including one (1) main building together with its accessory buildings, the open spaces and parking spaces required by this Ordinance.

2. A lot which is a part of a subdivision, the plat of which has been recorded in the office of the County Register of Deeds at the time of the adoption of this Ordinance, provided that said lot has a frontage of not less than seventy-five (75) feet; or an irregular tract lot described by a deed recorded in the office of the County Register of Deeds at the time of the passage of this Ordinance; provided that if a lot has less width or area as required by this Ordinance, the lot is not a buildable lot.

Section 249. Lot, Corner. A lot abutting upon two (2) or more streets at their intersection.

Section 250. Lot, Depth of. The average horizontal distance between the front and rear lot lines.

Section 251. Lot, Double Frontage. A lot having a frontage of two (2) streets as distinguished from a corner lot.

Section 252. Manufactured Home.

1. An industrialized building unit constructed on a chassis for towing to the point of use and designed to be used for continuous year-round occupancy as a single dwelling. For the purpose of this ordinance manufactured homes and will be regulated by types. Three types of homes are defined under these regulations.

    a. Type A Manufactured Home shall:

        i. Have more than one thousand one hundred (1,100) square feet of occupied space in a double-section or larger multi-section unit.

        ii. The age of the manufactured house may not exceed five (5) years from the date of manufacture.

        iii. Utilize a perimeter enclosure of metal, vinyl, wood, or Styrofoam in accordance with manufacturer's specifications.

        iv. Be anchored to the ground, in accordance with manufacturer's specifications, or as prescribed by the ANSI/NFPA 501 A Standards.

        v. Have a gabled roof with a pitch of at least 2/12 feet.

        vi. Have siding material of a type customarily used on site-constructed residence.

        vii. Have roofing material of a type customarily used on site-constructed residences.

    b. Type B Manufactured Home shall:

        i. Have more than 700 square feet of occupied space in a single, double, expando or multi-section unit.

        ii. Utilize a perimeter enclosure of metal, vinyl, wood, or Styrofoam in accordance with manufacturer's specifications.
        iii. Be anchored to the ground, in accordance with manufacturer's specifications or as prescribed by the ANSI/NFPA 501A Standards.

        iv. Have siding material of a type customarily used on site-constructed residence.

        v. Have roofing material of a type customarily used on site-constructed residences.

        vi. Be placed on a support system, in accordance with approved installation standards.

        vii. Must have been constructed after June 15, 1976.

c. Type C Manufactured Home shall:

i. Have more than 700 square feet of occupied space in a single, double, expando or multi-section unit.

ii. Utilize a perimeter enclosure of metal, vinyl, wood, or Styrofoam in accordance with manufacturer's specifications.

iii. Be anchored to the ground, in accordance with manufacturer's specifications or as prescribed by the ANSI/NFPA 501A Standards.

iv. Be placed on a support system, in accordance with approved installation standards.

v. Must have been constructed after June 15, 1976.

2. Installation standards

a. Support System

i. All HUD-Code manufactured homes of the Type A Classification shall be installed with load bearing foundations in conformance with the manufacturer's installation specifications.

ii. Type B an C manufactured homes not placed on a permanent foundation shall be installed on a support system in conformance with the manufacturer's installation specifications or with the support systems regulations in the ANSI/NFPA 501 A 1977 installation standards.

b. Siding/Skirting

i. Those manufactured homes utilizing a permanent foundation and permanent perimeter enclosure must have footings and crawl space or basement walls. The foundation shall be (a) an approved wood basement constructed of 2 x 6 framework and treated with water resistant materials; or (b) a foundation shall be constructed with eight inches poured concrete or concrete block.

The footing to be a minimum of eight (8) inches thick by sixteen (16) inches wide poured concrete with top of footing to be sixteen (16) inches below grade. The space between the floor joints of the home shall be completely enclosed with the permanent perimeter enclosure (except for required openings).

ii. All manufactured homes without a permanent perimeter enclosure shall have an approved foundation siding/skirting enclosing the entire perimeter of the home.

3. Nonconforming Homes.

   A manufactured ~~or mobile~~ home placed and maintained on a tract of land and deemed to be a legal nonconforming use prior to the adoption of this Ordinance shall continue to be a legal nonconforming use. If the nonconforming use is discontinued for a period of one year, the land thereafter must be used in conformity with all provisions of this Ordinance.

4. Replacement of Nonconforming Homes.

   Thereafter, upon application to the Zoning Officer and subsequent approval thereof, a manufactured home deemed a legal nonconforming use, may be replaced by a manufactured home, and provided the replacement is of an equal or higher type. Equal or higher type means that a type C manufactured home could be replaced with a Type A, B, or C manufactured home; A type B manufactured home could be replaced with a Type A or B manufactured home; A type A manufactured home could be replaced with a Type A manufactured home.

5. Structural Alteration.

   Due to its integral design, any structural alteration or modification of a manufactured home after it is placed on the site must be approved by the Zoning Officer.

6. Variance from Maximum Age Requirement

Type A manufactured homes may receive a variance from the maximum age requirement (Section 252 1.a.ii). The Board of Adjustment may grant a variance if the manufactured home meets the following requirements:

a. The applicant shall provide a photograph of the manufactured home's exterior and interior.

b. That it shall have been shown to the satisfaction of the Zoning Officer that the said manufactured home complies with the gas, plumbing, electrical, and construction requirements of Deuel County.

c. That the applicant shall obtain the written consent of all property owners owning property immediately adjacent (excluding streets and alleys) to the proposed building site and the consent of sixty-six (66) percent of the property owners within 150 feet (excluding streets and alleys) of said proposed location has been received.

Section 253. Modular Home.

1. Modular homes shall meet the following regulations.

    a. Modular homes shall meet or exceed Uniform Building Codes.

    b. Modular homes will include all off-site constructed homes, which may be transported to the site in one or more sections.

    c. Modular homes shall have more than 1,000 square feet in ranch style and 850 square feet split and be placed on a permanent foundation.

    d. Modular homes shall not have attached running gear and a trailer hitch or the capacity to have attached running gear and trailer hitch.

    e. Modular homes shall have a minimum of a 4/12-roof pitch.

    f. Have siding material of a type customarily used on site-constructed residences.

    g. Have roofing material of a type customarily used on site-constructed residences.

Section 254. Motel. A series of attached, semi-attached, or detached sleeping or living units, for the accommodation of transient guests and not customarily including individual cooking or kitchen facilities, said units having convenient access to off-street parking spaces for the exclusive use of guests or occupants.

Section 255. Nonconforming Use. Any building or land lawfully occupied by a use at the time of passage of this regulation or amendment thereto, which does not conform after the passage of this regulation or amendment.

Section 256. Non-Farm Dwelling. Any occupied dwelling which is not a farm dwelling.

Section 257. Parking Space. An area, enclosed or unenclosed, sufficient in size to store one (1) automobile, together with a driveway connecting the parking space with a street or alley.

Section 258. Parks and Recreation Areas. Public, non-commercial recreation facilities open to the general public an requiring minimal structural development, including, but not limited to playgrounds, parks, monuments, green strips, open space, mini-parks, athletic fields, boat launching ramps, piers and docks, picnic grounds, public campgrounds swimming pools, and wildlife and nature preserves, along with any necessary accessory facilities, rest rooms, bath houses, and the maintenance of such land and facilities, but not including private, commercial campgrounds, commercial recreation and/or amusement centers.

Section 259. Permit. A permit required by these regulations unless stated otherwise.
Section 260. Permitted Use. Any use allowed in a zoning district and subject to the restrictions applicable to that zoning district.

Section 261. Potential Pollution Hazard. A Class D Concentrated Animal Feeding Operation of 50 to 499 Animal Units may be required to obtain a special exception permit when a potential pollution hazard exists. Factors to be considered by the Zoning Officer in determining a Potential Pollution Hazard include the following:

1. The Concentrated Animal Feeding Operation does not meet the minimum setback and separation distances of these regulations.

2. A Potential Water Pollution Hazard exists due to siting over a shallow aquifer or drainage which contributes to the waters of the State.

Section 262. Private Shooting Preserves. An acreage of at least one hundred and sixty (160) acres and not exceeding one thousand two hundred and eighty (1,280) acres either privately owned or leased on which hatchery raised game is released for the purpose of hunting, for a fee, over an extended season.

Section 263. Process Generated Wastewater. Water directly or indirectly used in the operation of an animal feeding operation. The term includes spillage or overflow from watering systems; water and manure collected while washing, cleaning or flushing pens, barns, manure pits or other areas; water and manure collected during direct contact swimming, washing or spray cooling of animals; and water used in dust control.

Section 264. Process Wastewater. Process wastewater means any process generated wastewater and any precipitation (rain or snow) that comes into contact with the animals, manure, litter or bedding, feed, or other portions of the animal feeding operation. The term includes runoff from an open lot.

Section 265. Religious Farming Community. A corporation formed primarily for religious purposes whose principle income is derived from agriculture and/or a farm which may or may not be held in collective ownership, in which multiple families reside on-site and use or conduct activities upon the property which are participated in, shared, or used in common by the members of the group residing thereon.

Section 266. Rubble Site. A site for the disposition of refuse as defined by the South Dakota Department of Environment and Natural Resources.

Section 267. Sale or Auction Yard or Barn. A place or building where the normal activity is to sell or exchange livestock. Livestock normally in yard or barn for one (1) day during sale or auction.

Section 268. Sanitary Landfill. A site for the disposal of garbage and other refuse material.

Section 269. Seasonal Camp Trailers or Recreational Vehicles. A vehicle designed for temporary seasonal living quarters.

Section 270. Service Station. Any building or premises where automotive fuels are stored and made available for sale and dispensing through fixed equipment into fuel supply tanks or motor vehicles and where automotive supplies and accessories may or may not be available.

Section 271. Shall (when used in regard to concentrated animal feeding operations). means that the condition is an enforceable requirement of this permit.

Section 272. Shallow Aquifer. An aquifer vulnerable to contamination because the permeable material making up the aquifer (a) extends to the land surface so percolation water can easily transport contaminants from land surface to the aquifer, or (b) extends to near the land surface and lacks a sufficiently thick layer of impermeable material on the land or near the land surface to limit percolation water from transporting contaminants from the land surface to the aquifer.

Section 273. Shallow Well. A well which is located in a shallow aquifer.

Section 274. Shelterbelt. A strip or belt of trees or shrubs established to reduce soil erosion and to protect yards, lots, buildings, livestock and residences, recreation and wildlife from wind. For the purposes of this ordinance a shelterbelt shall include ten (10) or more trees planted in a line, separated by a distance of forty (40) feet or less.

Section 275. Shooting Range. shall be defined as an area for the discharge of weapons for sport under controlled conditions where the object of the shooting is an inanimate object such as, but not limited to, paper, metal or wooden targets.

Section 276. Should (when used in regard to concentrated animal feeding operations). means that the condition is a recommendation. If violations of the permit occur, the County will evaluate whether the producer implemented the recommendations contained in this permit that may have helped the producer to avoid the violation.

Section 277. Significant Contributor of Pollution. To determine if a concentrated animal feeding operation meets this definition, the following factors are considered:

1. Size of feeding operation and amount of manure reaching waters of the state;

2. Location of the feeding operation in relation to waters of the state;

3. Means of conveyance of manure and process wastewater into waters of the state; and

4. The slope, vegetation, rainfall and other factors affecting the likelihood or frequency of discharge of animal wastes and process wastewater into waters of the state.

Section 278. Special Exception. A special exception is a use that would not be appropriate generally or without restriction throughout the zoning division or district, but which, if controlled as to number, area, location, or relation to the neighborhood, would promote the public health, safety, welfare, morals, order, comfort, convenience, appearance, prosperity, or general welfare. Such uses may be permitted in **a** ~~such~~ zoning ~~division or~~ district as special exceptions, as specific provisions for such exceptions are made in these zoning regulations. Special exceptions are subject to evaluation and approval by the Board of Adjustment and are administrative in nature.

Section 279. Street, Highway, or Road. All property acquired or dedicated to the public and accepted by the appropriate governmental agency for street, highway or road purposes.

Section 280. Street, Highway or Road Right-of-Way (ROW) Line. A dividing line between a lot or parcel of land and a contiguous street, highway or road.

Section 281. Structural Alterations. Any change in the supporting members of a building, such as bearing walls or partitions, columns, beams, or girders, or any complete rebuilding of the roof or the exterior walls.

Section 282. Structure. Anything constructed or erected, the use of which requires permanent location on the ground or attached to something having a permanent location on the ground.

Section 283. Structure, Temporary. Anything constructed or erected, or placed, the use of which requires temporary location on the ground or attached to something having a temporary location on the ground.

Section 284. Temporary Fireworks Sales Stand. A structure utilized for the licensed resale of fireworks during the time period allowed by South Dakota State Law.

Section 285. Variance. A variance is a relaxation of the terms of the zoning ordinance where such variance will not be contrary to the public interest and where, owing to conditions peculiar to the property and not the result of the actions of the applicant, a literal enforcement of the ordinance would result in unnecessary and undue hardship. As used in this ordinance, a variance is authorized only for height, area, and size of structure or size of yards and open spaces; establishment or expansion of a use otherwise prohibited shall not be allowed by variance, nor shall a variance be granted because of the presence of non-conforming in the zoning district or uses in an adjoining zoning district.

Section 286. Waters of the State. means all waters within the jurisdiction of this state, including all streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private,

situated wholly or partly within or bordering upon the state.
Section 287. Yard. An open space on the same lot with a building, unoccupied and unobstructed. In measuring a yard for the purpose of determining the width of a side yard, the depth of a front yard, or the depth of a rear yard, the minimum horizontal distance between the lot line and bearing wall of the main building shall be used.

Section 288. Yard, Front. A yard extending across the front of a lot between the side yard lines, and being the minimum horizontal distance between the road right-of-way line and the main bearing wall of the main building or any projections thereof other than the projections of the usual steps, unenclosed balconies or open porch.

Section 289. Yard, Rear. Any yard extending across the rear of a lot measured between the side lot lines, and being the minimum horizontal distance between the rear lot line and the rear of the main building or bearing wall or any projections other than steps, unenclosed porches, or unenclosed balconies. On corner lots the rear yard may be to the rear of either street, provided that the minimum rear yard depth requirement shall be calculated on the longest average lot dimension. On interior lots the rear yard shall in all cases be at the opposite end of the lot from the front yard.

Section 290. Yard, Side. A yard between the main building and the side line of the lot being the minimum horizontal distance between the bearing wall of the building and the side yard line, and extending from the front lot line to the rear yard line.

Section 291. Zoning Officer. The individual appointed by the Board of County Commissioners and designated to administer and enforce the zoning ordinance.

ARTICLE III
ESTABLISHMENT OF DISTRICTS

Section 301. Districts. For the purpose of this regulation, the unincorporated areas of the County may be divided into any of the following zoning districts: A—Agricultural District; CI--Commercial/Industrial District; LP—Lake Park District; NR--Natural Resources District; AP--Aquifer Protection Overlay District; TD—Town District.

Section 302. Provision for Official Zoning Map.

1. The unincorporated area of the County is hereby divided into zones, or districts, as shown on the Official Zoning Map which, together with all explanatory matter thereon, is hereby adopted by reference and declared to be a part of this Ordinance. The Official Zoning Map shall be identified by the signature of the Chairperson of the Board of County Commissioners attested by the County Auditor, and bearing the seal of the County under the following words: "This is to certify that this is the Official Zoning Map referred to in Section 302 of Ordinance B2004-01 adopted July 6, 2004 by Deuel County, South Dakota."

   If, in accordance with the provisions of this Ordinance, changes are made in district boundaries or other matter portrayed on the Official Zoning Map, such changes shall be entered on the Official Zoning Map promptly after the amendment has been approved by the Board of County Commissioners, with an entry on the Official Zoning Map as follows: "On _____ by official action of the Board of County Commissioners, the following change(s) were made in the Official Zoning Map:" (brief description of nature of change), which entry shall be signed by the Chairman of the Board of County Commissioners and attested by the County Auditor. No amendment to this Ordinance which involves matter portrayed on the Official Zoning Map shall become effective until after such change and entry has been made on such map.

   No changes of any nature shall be made on the Official Zoning Map or matter shown thereon except in conformity with the procedure set forth in this Ordinance. Any unauthorized change of whatever kind by any person or persons shall be considered a violation of this Ordinance and punishable as provided under Article VIII.

2. In the event the Official Zoning Map becomes damaged, destroyed, lost, or difficult to interpret because of the nature or number of changes and additions, the Board of County Commissioners may, Ordinance, adopt a new Official Zoning Map which shall supersede the prior Official Zoning Map. The new Official Zoning Map shall be identified by the signature of the Chairman of the Board of County Commissioners attested by the County Auditor, and bearing the seal of the County under the following words: "This is to certify that this Official Zoning Map supersedes and replaces the Official Zoning Map adopted (date of adoption of map being replaced) for Deuel County, South Dakota."

Unless the prior Official Zoning Map has been lost, or has been totally destroyed, the prior map or any significant parts thereof remaining shall be preserved, together with all available records pertaining to its adoption or amendment.

Section 303. Interpretation of District Boundaries.

1. A district name or letter symbol shown on the district map indicates that the regulations pertaining to the district designated by that name or symbol extend throughout the whole area in the unincorporated portions of the County bounded by the district boundary lines.

2. In cases where the boundary line is given a position within a street, road, or non-navigable stream, it shall be deemed to be in the center of the street, road, or stream, and if the actual location of such street, road, or stream varies slightly from the location as shown on the district map, then the actual location shall control.

3. In cases where a boundary line is shown as being located a specific distance from a street line or other physical feature, this distance shall control.

4. In cases where a boundary line is shown adjoining or coincident with a railroad, it shall be deemed to be in the center of the railroad right-of-way and distances measured from the railroad shall be measured from the center of the designated mainline track.

5. Where the district boundaries are not otherwise indicated and where the property has been or may hereafter be divided into blocks and lots, the district boundaries shall be construed to be the lot lines and where the districts designated on the Official Zoning Map accompanying and made a part of this Ordinance are bounded approximately by lot lines, said lot lines shall be construed to be the boundary of such districts unless said boundaries are otherwise indicated on the map or by resolution.

6. In unsubdivided property, unless otherwise indicated, the district boundary line on the Official Zoning Map accompanying and made a part of this Ordinance shall be determined by the use of the scale contained on such map.

Section 304. All territory which may hereafter become a part of the unincorporated area of the County by the disincorporation of any village, town or city, or for some other reason may fall within the zoning jurisdiction of the County, shall automatically be classified in the "A" Agricultural District until within a reasonable time following disincorporation, or acquisition of zoning jurisdiction, the territory shall be appropriately classified by Ordinance.

Section 305. Application of District Regulations. Except as hereafter provided:

1. No building shall be erected, converted, enlarged, reconstructed or structurally altered, nor shall any building or land be used except for a purpose permitted in the district in which the building or land is located.

2. No building shall be erected, converted, enlarged, reconstructed, or structurally altered to exceed the height limit established for the district in which the building is located.

3. No building shall be erected, converted, enlarged, reconstructed, or structurally altered except in conformity with the area and parking regulations of the district in which the building is located.

4. The minimum yards and other open spaces, including lot area per family, required by this Ordinance for each and every building at the time of passage of this Ordinance or for any building hereafter erected shall not be encroached upon or considered as yard or open space requirements for any other buildings, nor shall any lot area be reduced beyond the district requirements of this Ordinance.

5. All sign sizes, light, and location shall, at a minimum, meet all State and Federal laws and regulations.

Section 306. Prohibited uses.

All uses and structures not specifically listed as a permitted or permitted by special exception shall be prohibited.

ARTICLE IV

NONCONFORMING USES OR LOTS OF RECORD

Intent: Within the districts established by this Ordinance or amendments that may later be adopted, there exist lots, structures, uses of land and structures, and characteristics of use, which were lawful before this Ordinance was passed or amended but which would be prohibited, regulated, or restricted under the terms of this Ordinance or future amendments. It is the intent of this Ordinance to permit these nonconformities to continue until they are removed, but not to encourage their survival. It is further the intent of this Ordinance that nonconformities shall not be enlarged upon, expanded or extended, nor be used as grounds for adding other structures or uses prohibited elsewhere in the same district.

Section 401. When a nonconforming use has been changed to a conforming use, it shall not be changed subsequently to any nonconforming use.

Section 402. In the event that a nonconforming use of any building or premises is, in fact, discontinued or its normal operation stopped for a period of one (1) year, the Board of Adjustment may adopt, after notice by registered or certified mail to the property owners, an amortization schedule to bring about the gradual elimination of such nonconforming use or occupancy.

Section 403. No existing building devoted to a use not permitted by this Ordinance, in the district in which such building is located, except when required to do so by law, shall be enlarged, extended, converted, reconstructed or structurally altered, unless such use is changed to a use permitted in the district in which the building is located.

Section 404. When a building, the use of which does not conform to the provisions of this Ordinance, is damaged by fire, explosion, or the public enemy, to the extent of more than sixty percent (60%) of its fair market value, it shall not be restored except in conformity with the regulations of the district in which the building is situated.

Section 405. Nothing in this Ordinance shall be interpreted as authorization for, or approval of, the continuance of the use of a building or premises in violation of zoning regulations in effect at the time of the effective date of this Ordinance.

Section 406. If two (2) or more lots or combinations of lots and portions of lots with continuous frontage in single ownership are of record at the time of passage or amendments of this Ordinance, and if all or part of the lots do not meet the requirements established for lot width and area, the lands involved shall be considered to be an undivided parcel for the purposes of this Ordinance, and no portion of said parcel shall be used or sold in a manner which diminishes compliance with lot width and area requirements established by this Ordinance, nor shall any division of any parcel be made which creates a lot width or area below the requirements stated in this Ordinance.

Section 407. On any nonconforming structure or portion of a structure containing a nonconforming use, work may be done on ordinary repairs, or on repairs or replacement of non-bearing walls, fixtures, wiring, or plumbing, provided that the nonconformity of the structure shall not be increased.

If a nonconforming structure or portion of a structure containing a nonconforming use becomes physically unsafe or unlawful due to the lack of repairs and maintenance, and is declared by any duly authorized official to be unsafe or unlawful by reason of physical condition, it shall not thereafter be restored, repaired, or rebuilt except in conformity with the regulations of the district in which it is located.

Section 408. Nonconforming lots of record which were zoned for small lot development prior to the adoption of amendments in 999 may be developed if other minimum requirements of this ordinance are met.

ARTICLE V

BOARD OF ADJUSTMENT, APPEALS, VARIANCE, AND SPECIAL EXCEPTIONS

Section 501. Within Deuel County, outside of incorporated municipalities, the power and jurisdiction related to this article shall be executed by the County Planning Commission~~,~~ known as the Board of Adjustment.

1. The Board of Deuel County Commissioners shall appoint the Deuel County Planning Commission and four (4) alternates to act as the County Board of Adjustment. The Alternates to the Board of Adjustment shall be the members of the Board of Deuel County Commissioners. If a Planning Commissioner acting as a Board of Adjustment member is unable to attend a meeting, the Deuel County Commissioner representing the district in which the applicant requesting a Board of Adjustment action, shall be the first alternate, subsequent alternates shall be chosen by the Board of Adjustment.

2. The Chairman, or in his or her absence the Acting Chairman, may administer oaths and compel the attendance of witnesses in order to execute the purposes of this article.

3. All meetings of the Board of Adjustment shall be open to the public. Board of Adjustment shall keep minutes of its proceedings and shall keep records of its examinations and other official actions, all of which shall be immediately filed in the office of the Board of Adjustment and shall be public record. The Board of Adjustment shall keep record in the minutes showing the vote of each member upon each question or if absent or failing to vote, indicating that fact.

Section 502. Appeals, Record of Appeal, Hearing and Stays. Appeals to the Board of Adjustment may be taken by any person aggrieved or by an officer, department, board or bureau of the County or city/town affected by any decision of the administrative officer. Such appeals shall be taken within a reasonable time, as provided by the rules of the Board of Adjustment by filing with the officer from whom the appeal is taken and with Board of Adjustment a notice of appeal specifying the grounds thereof. The officer from whom the appeal is taken shall forthwith transmit to the Board of Adjustment all the papers constituting the record upon which the action appealed from was taken.

An appeal stays all proceedings in furtherance of the action appealed from, unless the officer from whom the appeal is taken certifies to the Board of Adjustment after the notice of appeal shall have been filed with him, that by reason of facts stated in the certificate a stay would, in his opinion, cause imminent peril to life or property.

In such case, proceedings shall not be stayed otherwise than by a restraining order which may be granted by the County Board of Adjustment or by a court of record on application on notice to the officer from whom the appeal is taken and on due cause shown.

The Board of Adjustment shall fix a reasonable time for the hearing of the appeal, give public notice thereof, as well as due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing, any party may appear in person or by agent or by attorney.

Section 503. Powers and Jurisdiction Relating to Administrative Review. The Board of Adjustment shall have the power to hear and decide appeals where it is alleged there is error in any order, requirement, decision or determination made by an administrative official or agency based on or made in the enforcement of any zoning regulation or any regulation relating to the location of structures or to interpret any map.

Section 504. Powers and Jurisdiction Relating to Special Exceptions. The Board of Adjustment shall have the power to hear and decide, in accordance with the provisions of this regulation, requests for special exceptions or for decisions upon other special questions upon which the Board of Adjustment is authorized by this regulation to pass; to decide such questions as are involved in determining whether special conditions and safeguards as are appropriate under this regulation, or to deny special exceptions when not in harmony with the purpose and intent of this regulation. A special exception permit shall not be granted by the Board of Adjustment unless and until:

1. A written application for a special exception is submitted, indicating the section of this regulation under which the special exception is sought and stating the grounds on which it is requested.

2. Notice of hearing shall be published once ten (10) days prior to the hearing in a paper of general circulation in the area affected.

3. The public hearing shall be held. Any party may appear in person, or by agent or attorney.

4. The Board of Adjustment shall make a finding that it is empowered under the section of this ordinance described in the application to grant the special exception, Grant with conditions, or deny the special exception, and that the granting of the special exception will not adversely affect the public interest. An affirmative vote of two-thirds (2/3) of the full membership of the Board of Adjustment is required to approve a special exception.

5. Before granting any special exception, the Board of Adjustment shall make written findings certifying compliance with the specific rules governing individual special exceptions and that satisfactory provision and arrangement has been made concerning the following, where applicable:

    a. Entrance to and exit from property and proposed structures thereon with particular reference to automotive and pedestrian safety and convenience, traffic flow and control, and access in case of fire or catastrophe.

b. Off-street parking and loading areas where required, with particular attention to the items in (a) above and the economic, noise, glare, odor or other effects of the special exception on adjoining properties and properties generally in the district.

c. Utilities, with reference to locations, availability, and compatibility.

d. Screening and buffering with reference to type, dimensions, and character.

e. Signs, if any, and proposed exterior lighting with reference to glare, traffic safety, economic effect and compatibility and harmony with properties in the district.

f. Required yards and other open spaces.

g. General compatibility with adjacent properties and other property.

h. Refuse and service areas, with particular reference to the items in (a) and (b) above.

6. A special exception that is granted but not used within two (2) years shall be considered invalid unless an extension has been requested and approved by the Board of Adjustment.

6. In granting the Special exception Permit, the Board of Adjustment may prescribe appropriate conditions and safeguards in conformity with this regulation. Violation of such conditions and safeguards, when made a part of the terms under which the special exception permit is granted, shall be deemed a violation of this ordinance and punishable under Section 808 of this ordinance.

8. Reapplication. No applicant requesting a special exception permit whose application includes the same or substantially the same requirements for the same or substantially the same property which has been denied by the Board of Adjustment shall be again considered by the Board of Adjustment before the expiration date of six (6) months from the date of the final action on the petition.

Section 505. Powers and Jurisdiction Relating to Variances. The Board of Adjustment shall have the power, where, by reason of exception, narrowness, shallowness or shape of a specific piece of property at the time of the enactment of this regulation, or by reason of exceptional topographic conditions or other extraordinary and exceptional situation or condition of such piece of property, the strict application of any regulation under this regulation would result in peculiar and exceptional practical difficulties to, or exceptional and undue hardships upon, the owner of such property, to authorize, upon an appeal relating to the property, a variance from such strict application so as to relieve such difficulties or hardship, if such relief may be granted without substantially impairing the intent and purpose of this Ordinance. An affirmative vote of two-thirds (2/3) of the full membership of the Board of Adjustment is required to approve a variance.

1. No such variance shall be authorized by the Board of Adjustment unless it finds that the strict application of the Board of Adjustment would produce undue hardship; such hardship is not shared generally by other properties in the same zoning district and the same vicinity; the authorization of such variance will not be of substantial detriment to adjacent property and the character of the district will not be changed by the granting of the variance; and the granting of such variance is based upon reasons of demonstrable and exceptional hardship as distinguished from variations for purposes of convenience, profit, and caprice.

2. No variances shall be authorized unless the Board of Adjustment finds that the condition or situation of the property concerned or the intended use of the property is not of so general or recurring a nature as to make reasonably practicable the formulation of a general regulation to be adopted as an amendment to this regulation.

3. A variance from the terms of this regulation shall not be granted by Board of Adjustment unless and until a written application for a variance is submitted demonstrating that special conditions and circumstances exist which are peculiar to the land, structure, or buildings in the same district; that literal interpretation of the provisions of this regulation would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this regulation; that the special conditions and circumstances do not result from the actions of the applicant, and that granting the variance requested will not confer on the applicant any special privilege that is denied by this regulation to other lands, structures, or buildings in the same district.

4. No nonconforming use of neighboring lands, structures, or buildings in the same district, and no permitted or nonconforming use of lands, structures, or buildings in other districts shall be considered grounds for the issuance of a variance.

5. Notice of public hearing shall be given as in Section 504; the public hearing shall be held. Any party may appear in person, or by agent or by attorney; the Board of Adjustment shall make findings that the requirements of this section have been met by the applicant for a variance; the Board of Adjustment shall further make a finding that the reasons set forth in the application justify the granting of the variance, and that the variance is the minimum variance that will make possible the reasonable use of the land, building or structure; the Board of Adjustment shall further make a finding that the granting of the variance will be in harmony with the general purpose and intent of this regulation, and will not be injurious to the neighborhood, or otherwise detrimental to the public welfare.

6. In granting any variance, the Board of Adjustment may prescribe appropriate conditions and safeguards in conformity with this regulation. Violation of such conditions and safeguards, when made a part of the terms under which the variance is granted, shall be deemed a violation of this regulation and punishable under the terms of this regulation.

7. Under no circumstances shall the Board of Adjustment grant a variance to allow a use not permissible under the terms of this regulation in the district involved, or any use expressly or by implication prohibited by the terms of this regulation in said district.

8. A variance that is granted but not used within one (1) year shall be considered invalid unless an extension has been requested and approved by the Board of Adjustment.

9. Limitations. Any order of the Board of Adjustment granting a variance may be declared invalid by the Board of Adjustment unless substantially completed within two years from the date of such order. The Zoning Officer shall notify the property owner of record upon invalidation of a variance.

Section 506. Board of Adjustment has Powers of Administrative Officer on Appeals: Reversing Decision of Administrative Officer. In exercising the above-mentioned powers, the Board of Adjustment may reverse or affirm, wholly or partly, or may modify the order, requirement, decision or determination appeal from, and may make such order, requirement, decision or determination as ought to be made, and to that end shall have all the powers of the officer from whom the appeal is taken.

The concurring vote of two-thirds (2/3) of the Board of Adjustment shall be necessary to reverse any order, requirement, decision or determination upon which it is required to pass under this regulation or to effect any variation in this regulation.

Section 507. Appeals to a Court of Record. Any person or persons, jointly or severally aggrieved by a decision of the Board of Adjustment or any taxpayer, landowner, or any officer, department, board, or bureau of the County may appeal as provided by State law.

ARTICLE VI

DUTIES OF COUNTY ZONING OFFICER, BOARD OF COUNTY COMMISSIONERS, BOARD OF ADJUSTMENT, AND COURTS ON MATTERS OF APPEAL

It is the intent of this regulation that all questions of interpretation and enforcement shall be first presented to the County Zoning Officer, and that such questions shall be presented to the Board of Adjustment only on appeal from the decision of the Zoning Officer, and that recourse from the decision of the Board of Adjustment shall be to the courts as provided by law.

It is further the intent of this regulation Ordinance that the duties of the Board of County Commissioners in connection with this Ordinance shall not include hearing and deciding questions of interpretation and enforcement that may arise.

ARTICLE VII

SCHEDULE OF FEES, CHARGES, AND EXPENSES

Section 701. The Board of County Commissioners shall by resolution establish a schedule of fees, charges, and expenses and a collection procedure for building permits, certificates of zoning compliance, appeals, and other matters pertaining this Ordinance. The schedule of fees shall be posted in the office of the County Zoning Officer and may be altered or amended only by the Board of County Commissioners. Changes in the zoning regulations or map which are initiated by incorporated communities or the County shall not require a fee.

Until all applicable fees, charges, and expenses have been paid in full, no action shall be taken on any application or appeal.

ARTICLE VIII

ENFORCEMENT

Section 801. Enforcing Officer. The provisions of this regulation shall be administered and enforced by a County Zoning Officer appointed by the Board of County Commissioners, who shall have the power to make inspection of building or premises necessary to carry out his duties in the enforcement of this regulation.

Section 802. Right of Entry.

Whenever necessary to make an inspection to enforce any of the provisions of this regulation, or whenever the Zoning Officer or an authorized representative has reasonable cause to believe that there exists in any building or upon any premises a regulation violation, the Zoning Officer or an authorized representative may enter such building or premises at all reasonable times to inspect the same or to perform any duty imposed upon the Zoning Officer by this ordinance, provided that if such building or premises be occupied, they shall first present proper credentials and request entry; and if such building or premises be unoccupied, they shall first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and request entry. If such entry is refused, the Zoning Officer or an authorized representative shall have recourse to every remedy provided by law to secure entry.

When the Zoning Officer or an authorized representative shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner or occupant or any other persons having charge, care or control of any building or premises shall fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the Zoning Officer or an authorized representative for the purpose of inspection and examination pursuant to this regulation.

Section 803. Stop Order

Whenever any work is being done contrary to the provisions of this ordinance, the Zoning Officer may order the work stopped by notice in writing served on any persons engaged in the doing or causing such work to be done, and any such persons shall forthwith stop such work until authorized by the Zoning Officer to proceed with the work.

Section 8.04 Occupancy Violation.

Whenever any building or structure regulated by this ordinance is being used contrary to the provisions of this ordinance, the Zoning Officer may order such use discontinued and the structure, or portion thereof, vacated by notice served on any person causing such use to be continued. Such persons shall discontinue the use within the time prescribed after receipt of such notice to make the structure, or portion thereof, comply with the requirements of this ordinance.

Section 805. Building Permit.

1. Building Permit Required. It shall be unlawful to commence the excavation for or the construction of any building or any accessory building, or to commence the moving or alteration of any buildings, including accessory buildings, until the County Zoning Officer has issued a building permit for such work. Furthermore, it shall be unlawful to commence work until the building permit is displayed in a conspicuous place visible from public right-of-way.

2. Issuance of a Building Permit. In applying to the County Zoning Officer for a building permit, the applicant shall submit a dimensioned sketch or a scale plan indicating the shape, size, and height and location of all buildings, to be erected, altered, or moved and of any building already on the lot. He shall also state the existing and intended use of all such buildings, the location of existing or proposed water and sewer facilities, and supply such other information as may be required by the County Zoning Officer for determining whether the provisions of this regulation are being observed. If the proposed excavation or construction as set forth in the application are in conformity with the provisions of this regulation, and other regulations of the County then in force, the County Zoning Officer shall issue a building permit for such excavation or construction. If a building permit is refused, the County Zoning Officer shall state such refusal in writing, with the cause, and shall immediately thereupon mail notice of such refusal to the applicant at the address indicated upon the application. The County Zoning Officer shall grant or deny the permit within a reasonable time from the date the application is submitted.

3. The issuance of a building permit shall, in no case, be construed as waiving any provisions of this regulation. If the work described in any building permit has not begun within one hundred and eighty (180) days or has not been substantially completed within two (2) years of the date of issuance thereof, said permit shall expire; it shall be canceled by the Zoning Officer and written notice thereof shall be given to the persons affected. The notice shall state that further work as described in the canceled permit shall not proceed unless, and until, a new building permit has been obtained.

Section 806. Construction and Use to be as Provided in Application, Plans, Permits, and Application for Zoning Compliance.

Building permits issued on the basis of plans and applications approved by the Zoning Officer authorize only the use, arrangement, and construction set forth in such approved plans and applications, and no other use, arrangement or construction. Use, arrangement, or construction at variance with that authorized shall be deemed a violation of this ordinance, and punishable as provided by Section 808 of this regulation.

Section 807. Complaints Regarding Violations.

Whenever a violation of this Ordinance occurs, or is alleged to have occurred, any person may file a complaint. Such complaint stating fully the causes and basis thereof shall be filed with the Zoning Officer. The Zoning Officer shall record properly such complaint with the Board of Adjustment and investigate and take action thereon as provided by this Ordinance.

If the Zoning Officer shall find that any of the provisions of this Ordinance are being violated, he/she shall notify, in writing by certified mail with return receipt, the person responsible for such violations, indicating the nature of the violation and ordering the action necessary to correct it. The party responsible for the violation shall respond within seven (7) working days from receipt of the letter; otherwise, they will be considered in violation and punishable under Section 808.

Section 808 Violation and Penalty.

1. Violations of the ordinance shall be treated in the manner specified below.

    a. Any person who starts work for which a permit is required by this Zoning Ordinance, without first securing such permit and paying the prescribed fee, shall be charged according to the provisions of this section. All fees assessed there under shall be rounded to the nearest whole dollar.

        i. Upon finding such violation, staff shall send written notification of the requirement that a permit be obtained to the owner of the property involved by certified mail with return receipt requested. If application for said permit is filed within seven (7) working days from the date of receipt of the letter, an administrative fee shall be assessed in the amount of one hundred percent (100%) of the fee for the permit plus the cost of the postage for mailing the aforementioned notice. In no case shall this administrative fee be less than five dollars ($5.00), including the postage costs.

        ii. If application for said permit is filed after the deadline of seven working days following receipt of the notification of the requirement therefore, there shall be imposed an administrative fee in the amount of two (2) times the permit fee. The payment of the administrative fee shall not relieve such person from the provisions of (b) below.

        iii. Any administrative fee or penalty imposed under the provisions of this Zoning Ordinance shall be in addition to any other fees or charges required under this Zoning Ordinance.

a. It is declared unlawful for any person to violate any of the terms and provisions of these regulations or other official control adopted by the Board of County Commissioners pursuant thereto. Any person who violates, disobeys, omits, neglects or refuses to comply with or resists the enforcement of any provision of this Zoning Ordinance may be subject to a civil or criminal penalty. The penalty for violation of this Zoning Ordinance shall be two hundred dollars ($200.00) or imprisonment for not more than thirty (30) days, or both, and in addition the violator shall pay all costs and expenses involved in the case. Each and every day that such violation continues after notification may constitute a separate offense. All fines for violation shall be paid to the County Auditor and shall be credited to the General Fund of the County.

b. In the event, any building or structure is erected, constructed, reconstructed, altered, repaired, converted or maintained, or any building, structure or land is used in violation of these regulations, the appropriate authorities of Deuel County in addition to other remedies, may institute injunction, mandamus or other appropriate actions or proceedings in a court of competent jurisdiction to prevent, restrain, correct or abate such violation or threatened violation, and it is the duty of the State's Attorney to institute such action.

c. Any taxpayer of the County may institute mandamus proceedings in Circuit Court to compel specific performance by the proper official or officials of any duty required by these regulations.

ARTICLE IX

AMENDMENTS

Section 901. Petition by Individual Landowner or by County for Zoning Change -- Notice to Abutting Landowners. An individual landowner may petition the Board to change the zoning of all or any part of his property. The Board of County Commissioners may from time to time on its own motion, after public notice and hearing, and after a recommendation by the Planning Commission amend, supplement, or change the boundaries or regulations herein or subsequently established. Such petitioning landowner or County Commission, if rezoning is initiated by the County, shall also notify all other abutting landowners by registered or certified mail of the petitioned zoning change at least one (1) week days prior to any public hearing held thereon by the Board of County Commissioners. Property shall be considered as abutting even though it may be separated from the property of the petitioner by a public road or highway.

Section 902. Hearing by Planning Commission on Proposed Change -- Publication of Notice. Upon such filing or upon separate request by the Board, the Planning Commission shall hold a public hearing not less than ten (10) days after notice published in a newspaper of general circulation in the area affected. At such public hearing, any person may appear and request or protest the requested change. The Planning Commission shall consider all applications for zoning district classification changes and make a recommendation to the Board of County Commissioners.

Section 903. Hearing by County Commissioners. Following receipt of the recommendation of the Planning Commission, the Board shall hold a public hearing after notice in a newspaper of general circulation. The County Auditor shall give notice of the time and place of hearing once at least ten (10) days in advance by publication in a legal newspaper of the county. At such public hearing, any person may appear and request or protest the requested change.

Section 904. Adoption or Rejection by County Commissioners -- Publication of Change. The Board of County Commissioners shall thereafter by ordinance, either adopt or reject such amendment, supplement, change, modification or repeal, and if it is adopted by the Board of County Commissioners, the Board shall publish a notice of the fact of adoption once in the official newspaper in such County and take effect on the twentieth (20th) day after its publication.

Section 9.05 Reapplication. No application requesting a zoning district classification change on any property whose application includes any such property either entirely or substantially the same as that which has been denied by the Board, shall again be considered by the Planning Commission before the expiration of six (6) months from the date of the final action of the Board.

ARTICLE X

LEGAL STATUS PROVISIONS

Section 1001. Separability. Should any article, section or provision of this regulation be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of this regulation as a whole, or any part thereof, other than the part so declared to be unconstitutional or invalid.

Section 1002. Purpose of Catch Heads. The catch heads appearing in connection with the foregoing sections are inserted simply for convenience, to serve the purpose of an index and they shall be wholly disregarded by any person, officer, court or other tribunal in construing the terms and provisions of this regulation.

Section 1003. Effective Date. This regulation shall take effect and be in force from and after its passage and publication according to law.

ARTICLE XI

ZONING DISTRICTS

Section 1101. "A" Agricultural District

Section 1101.01. Purpose.

This district is established to maintain and promote farming and related activities within an environment which is generally free of other land use activities. Residential development will be discouraged to minimize conflicts with farming activities and reduce the demand for expanded public services and facilities.

Section 1101.02 Permitted Uses

1. Agricultural activities and farm related buildings, including Type E Concentrated Animal Feeding Operations;

2. Farm dwelling;

3. Site-built single-family residences;

4. Type A and Type B manufactured homes;

5. Modular homes;

6. Fisheries services and game propagation areas;

7. Horticultural services;

8. Orchards, tree farms, truck gardening, nurseries and greenhouses;

9. Public parks and recreation areas;

10. Home occupations;

11. Accessory uses and buildings.

Section 1101.03 Special exceptions

1. Airports and airstrips;

2. Church or cemetery;

3. Golf course, golf driving range;

4. Sand, gravel or quarry operation, mineral exploration and extraction, Rock crushers, concrete and asphalt mixing plants provided;

    a. The site meets the requirements of the State Department of Environment and Natural Resources.

    b. A site plan is provided indicating the following information:

        i. Present topography, soil types, depth to groundwater.

        ii. Location of existing water drainage, existing buildings, existing shelterbelts.

        iii. Identification of roads leading to the site.

        iv. Proposed changes at the site such as new shelterbelts, new buildings, changes in topography, new fence lines.

        v. Proposed monitoring wells, etc.

        vi. A requirement for receiving a permit for extractive/mining operations shall include a haul-road agreement between the applicant and appropriate governmental entity (Federal, State, County, Township, or Municipality).

        vii. The applicant may be required to provide information regarding how potential air, noise, and water pollution would be minimized.

        viii. A minimum of one thousand (1,000) feet from the mineral exploration and extraction; rock crushers; and concrete and asphalt mixing plants property line to the nearest residence; excluding: the residence of the above said uses operator.

5.Sanitary landfills, Rubble Sites provided:

    a. The site meets the requirements of the State Department of Water and Natural Resources.

    b. A site plan is provided indicating the following information:

        i. Present topography, soil types, depth to groundwater.

        ii. Location of existing water drainage, existing buildings, existing shelterbelts.

        iii. Identification of roads leading to the site.

        Proposed changes at the site such as new shelterbelts, new buildings, changes in topography, new fence lines.

v. Proposed monitoring wells, etc.

c. A minimum of one thousand (1,000) feet from the landfill property line to the nearest residence; excluding: the residence of the landfill operator.

6. Institution farms, including religious farming communities;

7. Domestic Sanitary Sewer Treatment Facility provided;

a. The site meets the requirements of the State Department of Water and Natural Resources.

b. A site plan is provided indicating the following information:

(1) Present topography, soil types, depth to groundwater.

(2) Location of existing water drainage, existing buildings, existing shelterbelts.

(3) Identification of roads leading to the site.

(4) Proposed changes at the site such as new shelterbelts, new buildings, changes in topography, new fence lines.

(5) Proposed monitoring wells, etc.

c. A minimum of one thousand (1,000) feet from the domestic sanitary sewer treatment facility property line to the nearest residence.

8. Class A, Class B, Class C, and Class D Concentrated Animal Feeding Operations. (See Concentrated Animal Feeding Operations, Article XIII.)

9. Stables, dog/cat kennels;

10. Veterinary clinics;

11. Junkyards/salvage yards, provided that they meet the following minimum requirements and other restrictions that the Board of Adjustment may deem appropriate:

a. Storage for junkyards shall be set back a minimum of two hundred (200) feet from any adjoining road right-of-way.

b. Junkyards shall be screened on all sides by a solid wall, with construction materials and design to be approved by the Board of Adjustment, at least two (2) feet above the highest stock pile or by a shelterbelt of shrubs and trees as approved by the Board of Adjustment; screening must be maintained in good repair.

c. No junkyards will be allowed within one thousand (1,000) feet from the junkyard property line to the nearest residence; excluding: the residence of the junkyard operator.

d. All junkyards must have a minimum lot of ten (10) acres.

12. Essential services – Overhead or underground electrical, gas, steam or water transmission or distribution systems and structures, or collection, communication, supply or disposal systems and structures used by public for protection of the public health, safety or general welfare, including towers, poles, wires, mains drains, sewers, pipes, conduits, cables satellite dishes, and accessories in connection therewith.

13. Wireless Telecommunication Towers and Facilities;

14.Commercial public entertainment enterprises not normally accommodated in commercial areas, including but not limited to, the following: music concerts, rodeos, tractor pulls, and animal and vehicle races;

15.Seasonal retail stands, including fireworks stands;

16. Extended Home Occupation--see Section 1210;

17.Caretaker residences associated with public or private enterprise.

18. Bed and breakfast

19. Game Lodge;

20.Private Shooting Preserve;

21.Group Home;

22. Wind Energy System;

23. On and Off-Site Sign;

Section 1101.04 Area Regulations

All buildings be set back from road right-of-way lines and lot line to comply with the following yard requirements.

1. Lot Size: All residential lots shall be a minimum of three (3) acres, except as provided in item 7 below. All other permitted uses and special exceptions shall have a minimum area and setback regulations as determined by the Board of Adjustment.

2. Front Yard

   The minimum depth of the front yard shall be not less than one hundred fifty (150) feet and in no case shall an accessory building be located or extend into the front yard. In the case of a corner lot, front yards shall be provided on both streets.

3. Side Yard

   The minimum width of a side yard shall be twenty-five (25) feet.

4. Rear Yard

   The minimum depth of a side yard shall be fifty (50) feet.

5. Maximum Lot Coverage: Dwellings and buildings accessory thereto shall cover not more than twenty-five (25) percent of the lot area.

6. Shelterbelts. (See Section 1208.)

7. The Board of Adjustment may allow a minimum residential lot size for the "A" Agricultural District under the following condition:

   a. Where single family home is requested on an established farmstead, so long as it is immediately connected to the existing farming operation.

8. Building additions that are no closer to the right-of-way or other property lines

Section 1101.05 Height Regulations

No main buildings shall exceed two and one-half (2 1/2) stories or thirty-five (35) feet in height. Exceptions include the following:

1. Agricultural buildings;

2. Chimneys, smokestacks, cooling towers;

3. Radio and TV towers;

4. Water tanks;

5. Elevators;

6. Others, providing that they are not used for human occupancy.

Section 1101.06 Access

1. The drive-way serving the parcel shall be separated from adjacent driveways on the same side of the road by the following distances depending upon road types:

    a. Local road: 100 feet;

    b. Collector road: 300 feet;

    c. Arterial: 500 feet;

    d. Minimum distance from intersection of two or more of the above: 100 feet

2. For all proposed uses and structures adjacent to a State highway, an access permit from the State of South Dakota Department of Transportation shall be required prior to the filing of a plat or the issuance of a building/use permit

Section 1101.07 Easements/Waivers

1. An Agricultural easement must be filed with Register of Deeds on all property to be used as a site for a newly constructed residence (farm and non-farm) or church prior to issuance of a building permit.

2. Applicants for residential development (farm and non-farm) are required to obtain a written waiver from the owner/operator of any existing concentrated animal feeding operation which is closer than one-half (1/2) mile from the proposed residential building site. This waiver shall be filed with the Register of Deeds.

Section 1102. "CI" Commercial/Industrial District

Section 1102.01 Purpose

The "CI" District is intended for commercial and industrial uses which due to their size and nature require highway access.

Section 1102.02 Permitted Use

1. On-Site Signs

Section 1102.03 Special exceptions

1. Implement sales and service;
2. Truck terminals and freight warehouses;
3. Seed sales and grain storage, fertilizer and chemical storage and sales;
4. Highway and street maintenance shops;
5. Welding and machine shops;
6. Gas, oil and liquid propane stations including bulk stations;
7. Public and private utilities;
8. Livestock sales;
9. Contractors' shops and yards;
10. Wholesale distributing companies;
11. Restaurants, taverns;
12. Motels;
13. Single family residences;
14. Adult Uses
15. Off-site signs;
16. Auto Sales;
17. Agricultural-based industries such as ethanol plants and corn/soybean processing.

Section 1102.04 Area Regulations

1. Lot Area. Lot area shall be determined by need, setback, side yards, rear yards, parking requirements, freight handling requirements, building site and future expansion; however, in no case shall a lot have less than three (3) acres. An applicant for a special exception shall provide a proposed site plan which can be reviewed by the Board of Adjustment. For commercial and industrial uses, buildings shall occupy no more than twenty-five (25) percent of the lot.

2. Front Yard. There shall be a front yard on each street which a lot abuts, and which yard shall be not less than one hundred fifty (150) feet in depth.

3. Side Yards. On lots adjacent to a residential area, all buildings and incidental areas shall be located so as to provide a minimum side yard of one hundred (100) feet, which shall be landscaped on the side adjacent to the residential area. All other side yards shall be a minimum of fifty (50) feet.

4. Rear Yards. No building shall be constructed within fifty (50) feet of the rear lot line. The rear yard shall be one hundred (100) feet if the lot abuts an interstate or major highway.

Section 1102.05 Access

1. All property in the “CI” District must have access to a County, State, or Federal Road.

2. The drive-way serving the parcel shall be separated from adjacent driveways on the same side of the road by the following distances depending upon road types:

    a. Local road: 100 feet;

    b. Collector road: 300 feet;

    c. Arterial: 500 feet;

    d. Minimum distance from intersection of two or more of the above: 100 feet

3. For all proposed uses and structures adjacent to a State highway, an access permit from the State of South Dakota Department of Transportation shall be required prior to the filing of a plat or the issuance of a building/use permit

Section 1103. “LP" Lake-Park District

Section 1103.1 Purpose

The Lake-Park District is established to provide for orderly residential and recreational development, together with certain public facilities, customary home occupations, and certain recreation oriented commercial establishments, along lakeshores.

Section 1103.2 Area Contained in “LP” District

All land, unless otherwise zoned, within one thousand (1,000) feet of the established normal high water line of a designated lake shall be contained in the Lake-Park District and usage shall conform to the regulations for this District.

Section 1103.3 Permitted Uses

1. Site-built Single-family residential usage;

2. Public parks and recreation areas;

3. Agriculture and horticulture uses;

4. Type A Manufactured Homes;

5. Modular Homes;

Section 1103.4 Special exceptions

1. Private parks and campgrounds;

2. Resorts;

3. Restaurants;

4. Home occupations;

5. Shoreline alterations, filling, grading, lagooning, dredging, and retaining walls, in a strip paralleling the shoreline and extending thirty-five (35) feet inland from all points along the high water mark of the shoreline.

6. Multiple family dwellings;

7. Type B and C manufactured homes that are older than ten (10) years, if the owner intends to upgrade or modify.

8. Accessory structures located on a lot adjacent to a lot with principle structure which is separated by a public or private road.

9. Storage

10. Commercial campground

Section 1103.5 Area Regulations:

1. Each lot shall have a lot depth of not less than one hundred and fifty (150) feet.

2. Each lot shall have a shoreline frontage of not less than seventy-five (75) feet in width.

3. Each lot shall have a road frontage of not less than fifty (50) feet in width.

4. Each building shall be set back not less than fifty (50) feet from the established normal high water mark and or have a rear yard of fifty (50) feet.

5. Each building shall be set back not less than fifty (50) feet from State or Federal highways and must be set back a minimum of thirty (30) feet for all other roads and ten (10) feet from the side yard property line. Exception: On those lots platted prior to June 8, 1976, which have a lot width of less than seventy-five (75) feet, each building shall have a side yard of not less than a distance equal to ten (10) percent of the lot width. Under no circumstances shall a building have a side yard of less than five (5) feet. Roof overhangs may infringe upon the side yard requirements no more than one and one-half (1.5) feet.

6. For lakes and ponds: No structure except piers and docks shall be placed at an elevation such that the lowest floor, including basement, is less than three (3) feet above the established normal high water mark. In those instances where sufficient data on known high water levels are not available, the elevation line of permanent terrestrial vegetation shall be used as the estimated high water elevation. When fill is required to meet this elevation, the fill shall be required to stabilize or be tamped down before construction is begun.

7. Sealed holding tanks for individual cabins and homes are required for all lots containing less than twenty thousand (20,000) square feet and not within the Lake Cochrane Sanitary District.

8. There shall be no more than one primary residential building on any parcel of land.

9. Where two parcels of land are purchased and joined together by one common boundary, the setbacks established above shall pertain to the perimeter of the combined lots.

Section 1103.6 Shoreline Alterations

These regulations are deemed necessary along the shores of natural waters to protect scenic beauty, control erosion and reduce effluent and nutrient flow from the shoreland.

1. Removal of Shore Cover
   Tree and shrub cutting in a strip paralleling the shoreline and extending thirty-five (35) feet inland from all points along the established normal high water mark of the shoreline shall be limited in accordance with the following provisions:

   a. Cutting shall leave sufficient cover to screen cars, dwellings, and accessory structures, except boathouses, as seen from the water, to preserve natural beauty and to control erosion.

   b. Natural shrubbery shall be preserved as far as practicable, and where removed it shall be replaced with other vegetation that is equally effective in retarding runoff, preventing erosion and preserving natural beauty.

   c. The removal of natural shrubbery and its replacement shall require the granting of a permit by the Zoning Officer. Petition for such permit shall be accompanied by a plan showing the work to be accomplished. The granting of such permit shall be conditional upon a contract requiring the petitioner to give to the Zoning Officer, within one (1) year after the date of grant, satisfactory evidence of compliance with such plan or pay for the cost of such compliance by the County.

2. Shoreline Stabilization

   Shoreline stabilization, including but not limited to riprapping and retaining walls, shall require the granting of a permit by the Board of Adjustment.

Section 1103.7 Filling, Grading, Lagooning and Dredging

1. Filling, grading, lagooning or dredging which would result in substantial detriment to natural waters by reason of erosion, sedimentation or impairment of fish and aquatic life is prohibited.

2. A permit shall be required for any filling or grading. This requirement does not apply to soil conservation practices such as terraces, runoff diversions and grassed waterways which are used for sediment retardation.

3. Building permits shall be required for all retaining walls or structures.

4. Small filling and grading projects and small shoreline repair or stabilization projects limited to one hundred (100) square feet shall require a Permit. The Zoning Officer can give the above permit without the approval of the Board of Adjustment, all other permits must be approved by the Board of Adjustment.

Section 1103.8 Fence Requirements

All fences, walls, and hedges shall be set back not less than fifty (50) feet from the high water mark and not less than thirty (30) feet from the road right-of-way and shall have a maximum height of eight (8) feet. All fences shall require the granting of a permit by the Zoning Officer.

Section 1104. “NR” Natural Resource District

Section 1104.01 Purpose

The purpose of the Natural Resource District is to provide for the retaining of natural vegetation of a particular area, to preserve the natural environment and resources from destructive land uses and to protect wildlife habitat. Such an area may include but is not limited to flood plains of rivers, streams, and lakes, abandoned quarries, certain wetlands, natural prairies, and historical sites.

Section 1104.02 Area Contained in "NR" District

All lands, unless otherwise zoned, within three hundred (300) feet of wetlands that are totally or partially owned by the State or Federal governments as wildlife production or public shooting areas and meandered lakes.

Section 1104.03 Permitted Uses

1. Wildlife production areas;
2. Game refuges;
3. Historic sites and/or monuments;
4. Designated natural prairies;
5. Public hunting and fishing access areas.
6. Horticulture uses and livestock grazing.

Section 1104.04 Uses Permitted by Special exception if Deemed Not Detrimental to District

1. Transportation and utility easements and rights-of-way.
2. Utility substations;
3. Public parks and/or playgrounds;

Section 1105. Aquifer Protection Overlay District

Section 1105.01 Purpose and Intent:

The Deuel County Zoning Commission recognizes (1) that residents of Deuel County rely exclusively on ground water for a safe drinking water supply and (2) that certain land uses in Deuel County can contaminate ground water particularly in shallow/surficial aquifers.

The purpose of the Aquifer Protection Overlay District is to protect public health and safety by minimizing contamination of the shallow/surficial aquifers of Deuel County. It is the intent to accomplish this, as much as possible, by public education and securing public cooperation.

Appropriate land use regulations will be imposed, however, which are in addition to those imposed in the underlying zoning districts or in other county regulations. It is not the intent to grandfather in existing land uses which pose a serious threat to public health through potential contamination of public water supply wellhead areas.

Section 1105.02 Definitions for Aquifer Protection Overlay District:

1. Abandoned Well: A well no longer used or intended to be used as a water source.

2. Concentrated Animal Feeding Operation: (See Concentrated Animal Feeding Operations, Article XIII.)

3. Best Management Practices: Measures contained in Soil Conservation Service South Dakota Technical Guide, either managerial or structural, that are determined to be the most effective, practical means of preventing or reducing pollution inputs from non-point sources to water bodies.

4. Chemigation: The process of applying agricultural chemicals (fertilizer or pesticides) through an irrigation system by injecting the chemicals into the water.

5. Class V Injection Well: A conduit through which potentially contaminated but generally non-hazardous fluids can move below land surface to the subsurface. The types of primary concern in Deuel County are (1) commercial/industrial facility septic tanks used to dispose of more than domestic wastewater, and (2) dry wells for repair/service bay drains at facilities servicing motorized vehicles/equipment.

6. Contamination: The process of making impure, unclean, inferior or unfit for use by introduction of undesirable elements.

7. Contingency Plans: Detailed plans for control, containment, recovery and clean up of hazardous materials released during floods, fires, equipment failures, leaks and spills.

8. Development: The carrying out of any surface or structure construction, reconstruction or alteration of land use or intensity of use.

9. Facility: Something built, installed or established for a particular purpose.

10. Grey Water: All domestic wastewater except toilet discharge water.

11. Hazardous Materials: A material which is defined in one or more of the following categories:

    a. Ignitable: A gas, liquid or solid which may cause fires through friction, absorption of moisture, or which has low flash points. Examples: white phosphorous and gasoline.

    b. Carcinogenic: A gas, liquid or solid which is normally considered to be cancer causing or mutagenic. Examples: PCBs in some waste oils.

    c. Explosive: A reactive gas, liquid or solid which will vigorously and energetically react uncontrollably if exposed to heat, shock, pressure or combinations thereof. Examples: dynamite, organic peroxides and ammonium nitrate.

    d. Highly Toxic: A gas, liquid or solid so dangerous to man as to afford an unusual hazard to life. Examples: parathion and chlorine gas.

    e. Moderately Toxic: A gas, liquid or solid which through repeated exposure or in a single large dose can be hazardous to man. Example: atrazine.

    f. Corrosive: Any material, whether acid or alkaline, which will cause severe damage to human tissue, or in case of leakage might damage or destroy other containers of hazardous materials and cause the release of their contents. Examples: battery acid and phosphoric acid.

12. Manure Storage Area: An area for the containment of animal manure in excess of 8,000 pounds or 1,000 gallons.

13. Leaks and Spills: Any unplanned or improper discharge of a potential contaminant including any discharge of a hazardous material.

14. Pasture: A field that provides continuous forage to animals and where the concentration of animals is such that a vegetative cover is maintained during the growing season.

15. Primary Containment Facility: A tank, pit, container, pipe or vessel of first containment of a liquid or chemical.

16. Secondary Containment Facility: A second tank, catchment pit, pipe or vessel that limits and contains a liquid or chemical leaking or leaching from a primary containment area; monitoring and recovery systems are required.

17. Shallow Aquifer: An aquifer vulnerable to contamination because the permeable material making up the aquifer (1) extends to the land surface so percolation water can easily transport contaminants from land surface to the aquifer, or (b) extends to near the land surface and lacks a sufficiently thick layer of impermeable material on the land or near the land surface to limit percolation water from transporting contaminants from the land surface to the aquifer.

18. Ten Year Time of Travel Distance: The distance that ground water will travel in ten years. This distance is a function of aquifer permeability and water table slope.

19. Zone of Contribution: The entire area around a well or wellfield that contributes water to the well or wellfield.

Section 1105.03 Delineation and Regulation of Aquifer Protection Overlay Zones

Boundaries for the aquifer protection zones for the Aquifer Protection Overlay District are shown on maps prepared by the East Dakota Water Development District (EDWDD), Brookings, South Dakota and by the South Dakota Geologic Survey, Vermillion, South Dakota. Said maps are hereby adopted by reference as part of these regulations as if the maps were fully described herein.

The Aquifer Protection Overlay District is divided into two zones. The zone of contribution for Zone A, was mapped by the (EDWDD) with South Dakota Geological Survey (SDGS) technical assistance using techniques outlined in the U.S. Environmental Protection Agency publication "Guidelines for Delineation of Wellhead Protection Areas", June, 1987. The shallow/surficial aquifer boundary for Zone B was mapped by the SDGS as Task 3 of EDWDD's comprehensive ground water project.

Section 1105.04 Zone A -- Aquifer Critical Impact Zones

Zone A, the wellhead protection area, is the mapped zone of contribution around all public water supply wells or wellfields in shallow/surficial aquifers and includes land upgradient from the well or wellfield to the ten year time of travel boundary.

Section 1105.05 Permitted Uses in Zone A:

The following uses are permitted provided they meet appropriate performance standards outlined for aquifer protection overlay zones:

1. Agriculture;

    a. Application of manure is permitted with approved nutrient management plan.

2. Horticulture;

3. Parks, greenways or publicly owned recreational areas;

4. Necessary public utilities/facilities designed so as to prevent contamination of groundwater.

Section 1105.06 Special exceptions in Zone A:

The following uses are permitted only under the terms of a special exception and must conform to provisions of the underlying zoning district and meet Performance Standards outlined for Aquifer Protection Overlay Zones.

1. Expansion of existing uses to the extent they remain or become nonconforming and to the extent allowed by the underlying district. The Board of Adjustment shall not grant approval unless it finds the proposed expansion does not pose greater potential for groundwater contamination than the existing use.

2. All uses not permitted or not prohibited in Zone A may be approved by the Board of Adjustment provided they can meet Performance Standards outlined for the Aquifer Protection Overlay Zones.

Section 1105.07 Prohibited Uses in Zone A:

The following uses are expressly prohibited in Zone A:

1. New Concentrated Animal Feeding Operations, including Class A, Class B, Class C, Class D, and Class E.

2. Manure storage areas;

3. Disposal of solid waste except spreading of manure;

4. Outside unenclosed storage of road salt;

5. Disposal of snow containing de-icing chemicals;

6. Processing and storage of PCB contaminated oil;

7. Car washes;

8. Auto service, repair or painting facilities and junk or salvage yards;

9. Disposal of radioactive waste;

10. Graveyards or animal burial sites;

11. Detonation sites;

12. Open burning except ditches, fields and non-hazardous yard and household wastes such as paper, wood and leaves.

13. All other facilities involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having a potentially harmful impact on ground water quality.

14. Fall application of nitrogen fertilizer except spreading of manure;

15. Land spreading of petroleum contaminated soil;

16. Land spreading or dumping of waste oil;

17. Class V injection wells;.

18. Existing Concentrated Animal Feeding Operations will not be able to expand beyond a total of three hundred (300) animal units.

19. Earthen storage basins and lagoons;

20. Stockpiling of solid waste;

21. Chemigation with liquid fertilizer, pesticides and/or herbicides

22. Storage of liquid fertilizer, pesticides and/or herbicides without an approved permanent secondary storage system.

Section 1105.08 Zone B -- Aquifer Secondary Impact Zones

Zone B is the remainder of the mapped shallow/surficial aquifer in the County not included in Zone A. Zone B is being protected because (1) the aquifer is a valuable natural resource for future development, (2) the aquifer provides drinking water supply for individual domestic users, (3) contamination is not justified just because this area is not currently used for public water supply and (4) contaminants from this area could eventually enter Zone A.

Section 1105.09 Permitted Uses in Zone B:

1. All uses permitted in the underlying zoning districts provided that they can meet the Performance Standards as outlined for the Aquifer Protection Overlay Zones.

Section 1105.10 Special exceptions in Zone B:

1. All special exceptions allowed in underlying districts, with the exception of those expressly prohibited in Zone B, may be approved by the Board of Adjustment provided they can meet Performance Standards outlined for the Aquifer Protection Overlay Zone.

2. All new and expansion of existing concentrated animal feeding operations may be required to conduct shall require soil borings to determine impermeable material between land surface and the aquifer.

3. Earthen storage basins and lagoons may be approved by the Board of Adjustment after site-specific review. Earthen storage basins and lagoons shall require soil borings to determine impermeable material between land surface and the aquifer. The Board reserves the right to require an impermeable liner to prevent ground water contamination.

Section 1105.11 Prohibited Uses in Zone B:

The following uses are expressly prohibited in Zone B:

a. Fall application of nitrogen fertilizer except spreading of manure

b. Land spreading of petroleum contaminated soil;

c. Land spreading or dumping of waste oil;

d. Class V injection wells;

Section 1105.12 Performance Standards For Aquifer Protection Overlay Zones:

The following standards shall apply to land uses in Zones A and B of the Aquifer Protection Overlay Districts:

1. New or replacement septic tanks and associated drain fields for containment of human wastes must conform with regulations established by the State Department of Environment and Natural Resources.

2. (Reserved)

3. Storage of petroleum products in quantities exceeding (100) gallons at one locality in one tank or series of tanks must be in elevated tanks; such tanks larger than one thousand (1,000) gallons must have secondary containment system where it is deemed necessary by the County Zoning Office.

4. Any commercial or industrial facility, not addressed by (2) or (3) above, involving collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste, except for spreading of manure, in excess of one thousand (1,000) pounds and/or one hundred (100) gallons which has the potential to contaminate ground water must have a secondary containment system which is easily inspected and whose purpose is to intercept any leak or discharge from the primary containment vessel or structure. Underground tanks or buried pipes carrying such materials must have double walls and inspectable sumps.

5. When pastured animals are concentrated for winter feeding and the number of animal units exceeds two hundred (200), measures shall be employed to prevent runoff of manure

6. Owners/operators of active or abandoned feedlots shall handle and dispose of manure in accordance with Soil Conservation Service South Dakota engineering Standard, Nutrient Management System (680)

7. Discharge of industrial process water is prohibited without County Zoning Office approval.

8. Auto service, repair or painting facilities and junk or salvage yards shall meet all State and Federal standards for storage, handling and disposal of petroleum products and shall properly dispose of all other potentially hazardous waste materials.

9. Any facility involving collection, handling, manufacture, use, storage, transfer or disposal of hazardous materials must prepare and have on file in the County Zoning Office an acceptable contingency plan for preventing hazardous chemicals from contaminating the shallow/surficial aquifer should floods, fire, other natural catastrophes or equipment failure occur:

    a. For flood control, all underground facilities shall include a monitoring system and a secondary standpipe above the 100 year frequency flood level. All above ground facilities, an impervious dike, above the 100 year flood level and capable of containing 120 percent of the largest storage volume, with an overflow recovery catchment area (sump).

    b. For fire control, all facilities shall include a fire retardant system and provision for dealing safely with both health and technical hazards that may be encountered by disaster control personnel in combating fire. Hazards to be considered are overhead and buried electrical lines, pipes, other buried objects and other hazardous liquids, chemicals or open flames in the immediate vicinity.

    c. For equipment failures, plans shall include but not limited to:

        i. Below ground level, provision for removal and replacement of leaking parts, a leak detection system with monitoring, and overfill protection system.

ii. Above ground level, provision for monitoring, replacement, repair, and cleanup of primary containment systems.

d. For other natural or man-caused disasters occurring, the owner and/or operator shall report all incidents involving liquid or chemical material which may endanger health and/or of disaster personnel and/or the general public.

e. Agricultural operations are exempted from performance standard (9) unless chemicals are stored which are on the Superfund and Reauthorization Act of 1986 (SARA Title III) extremely hazardous substance list in quantities exceeding the threshold planning quantity at any one time.

f. The County Zoning Office, Public Water Supplies, and Department of Environment and Natural Resources shall be informed within 24 hours of any leak, spill or release of materials that might potentially contaminate groundwater.

10. Since it is known that improperly abandoned wells can become a direct conduit for contamination of groundwater by surface water, all abandoned wells should be plugged in conformance with South Dakota Well Construction Standards, Chapter 74:02:04:67-70.

Section 1105.13 Grant of Permit, Alteration of Use:

Before a permit is granted, the County Zoning Officer must examine an application and determine that the proposed use, activity or development meets the provisions of this ordinance.

When securing a use permit, the owner/developer agrees to make future improvements which become necessary to prevent contamination of shallow/surficial aquifers and the owner/developer must allow County personnel to inspect any improvements to verify they meet the performance standards.

Whenever any person has an existing use, activity or development and thereafter desires alteration or expansion of the authorized use, such persons shall apply for a permit. The owner/developer may appeal a County Zoning Officer's decision to modify or deny a requested permit to the ~~County Planning~~/Board of Adjustment

Any lawful use in existence on the effective date of this ordinance shall be permitted to continue provided it can be shown such use does not threaten public health and safety by potential contamination of water in the shallow/surficial aquifers.

Exceptions:

1. Storage of liquids, chemicals and fertilizers used by an individual or corporation in their agricultural operations during planting and crop cultivation are exempt from the requirements of this ordinance March 1 to October 1. However, Best Management Practices are encouraged, particularly in Zone A. Tanks used for chemigation are exempt from secondary containment regulations but secondary containment is encouraged.

2. Storage of liquid or dry fertilizer in amounts equal to or less than 1,000 pounds or 100 gallons, stored indoors by each farm operator is exempt from the requirements of this ordinance.

Section 1105.14 Limitation of County Liability:

Nothing in this ordinance shall be construed to imply that Deuel County, by issuing a permit, has accepted any of an owner's or developer's liability if a permitted development contaminates water in shallow/surficial aquifers.

Section 1105.15 Underlying Zones:

Underlying zoning restrictions apply along with restrictions set forth in the Aquifer Protection Overlay District.

Section 1106. "TD" Town District

Section 1106.01 Purpose

The Town District is established to provide for orderly low-density residential development, together with certain public facilities, and commercial/industrial uses which are not detrimental in the unincorporated town of Bemis.

Section 1106.02 Permitted Uses

1. Single-family residential usage, including Type A and Type B Manufactured Homes.
2. Public parks.
3. Agriculture and horticulture uses, excluding feedlots.
4. Home occupations.

Section 1106.03 Special Exceptions

1. Retail and service businesses.
2. Light manufacturing.
3. Bar or tavern.
4. Warehouse.
5. Multi-family housing.
6. Contractors' offices, shops, and yards.
7. Manufactured Home Court

Section 1106.04 Area Regulations

Residential

Minimum Yard Requirements:
Front----------Twenty-five (25) feet
Side----------Fifteen (6) feet
Rear----------Twenty-five (25) feet

Minimum Lot Size:

Public Water Supply/Septic Tank----------20,000 Sq. Ft.
Well/Septic Tank----------43,560 Sq. Ft.
Public Water Supply/Public Sewer----------9,600 Sq. Ft.

Commercial

Lot size shall be determined by off-street parking needs; availability of water and sewage disposal systems; adjacent land uses; need for screening; and type of business. Front, side and rear yards shall be determined by the Board of Adjustment.

Industrial

Lot size shall be determined by off-street parking needs; impact on adjoining land uses and need for screening or buffering from residential areas; availability of water and sewage disposal systems; type of manufacturing or storage facilities.

ARTICLE XII

GENERAL REQUIREMENTS

Pursuant to the purpose of this regulation are certain general requirements that are not provided for under Article XI Zoning Districts. These requirements are set forth under this Article.

Section 1201. Screening. Where any "CI" use is adjacent to any residential district, that use (building, parking or storage) shall be appropriately screened from the residential use by planting, except where planting may be in conflict with vision clearance.

Section 1202. Intersection Visibility. At intersections of any roads, no planting, structure, sign, fence, wall, or obstruction to vision between the range of three (3) feet and eight (8) feet in height measured from the center line of the road shall be placed or maintained within the triangular area formed by the intersection road right-of-way lines and a straight line connecting points on said road right-of-way line each of which is fifty (50) feet distance from the point of intersection.

Section 1203. Refuse. In all zoning districts, refuse (rubbish, garbage, trash, wastes, or debris) shall be kept within a complete enclosed building or specially designed closed container made for such purpose. Owners of vacant lot shall be responsible for keeping their property free of trash.

Section 1204. Unlicensed Vehicles. Vehicles not in use and without current license may not be kept in any uncovered area other than a designated junk, salvage yard, or designated collection site. EXCEPTION: Antique cars being refurbished shall not be required to be kept in a covered area or in above designated areas.

Section 1205. Moved in Buildings.

1. Any building, except those in the "A" Agricultural District, moved into any use district must secure a building permit from the County Zoning Officer.

2. Any residence moved into any use district must have signature by petition of sixty-six (66) percent of the adjoining landowners and of seventy-five (75) percent of the landowners within two hundred (200) feet. EXCEPTION: A new residence to be used for first occupancy, constructed off the property and moved to location shall not require adjoining landowners' approval.

Section 1206. Minimum Water and Sewer Requirements. A water and sewer system cannot be approved until it meets the following standards:

1. All public utilities and facilities shall be located, elevated, and constructed to minimize or eliminate flood damage; and

2. All new or replacement water supply systems and sanitary sewage systems, in addition to meeting the requirements of the South Dakota Department of Water and Natural Resources, must be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.

Section 1207. (Reserved)

Section 1208. Shelterbelt Setback Requirements. Permits are required for all shelterbelt plantings. A shelterbelt, consisting of one (1) or more rows shall not be established within one hundred fifty (150) feet of a public road right-of-way line on the north and west sides of roads and not within one hundred (100) feet of a public road right-of-way line on the south and east sides of roads. Shelterbelts shall not be established within one hundred fifty (150) feet of adjoining property lines without written permission of adjoining property owners.

Trees or shrubs used for landscaping and windbreak are allowed in a controlled area. The controlled area is defined as the area within one hundred (100) feet of homes or farm buildings, but not closer to the right-of-way than fifty (50) feet. Except for the following, plantings within the controlled area are exempt from this regulation. Four or more trees in a row are not allowed with the controlled area. Deciduous trees which are spotted or staggered within the controlled area can be no closer than twenty (20) feet. Conifer trees which are spotted or staggered within the controlled area can be no closer than twenty-five (25) feet. The distance between trees shall be determined by measuring distance between tree trunks.

The setback requirements also apply to volunteer trees that the landowner allows to grow.

Section 1209. Home Occupation. Home occupations shall be subject to the following requirements.

1. Such use shall be conducted entirely within a dwelling and carried on by not more than two (2) individuals, one of whom is the principal occupant.

2. Such use shall be clearly incidental and secondary to the use of the dwelling purpose and shall not change the residential character thereof.

3. The total area used for such purposes shall not exceed the equivalent of one-fourth (1/4) the floor area, in square feet, of the first floor of the user's dwelling unit, if any, otherwise of the main floor of such dwelling unit; but in any instance a maximum of three hundred (300) square feet shall be allowed.

4. There shall be no advertising, display or other indications of a home occupation on the premises except as follows: (1) there is used no sign other than a non-lighted and non reflecting name plate not more than four (4) square feet in area, which name plate may designate the home occupation carried on within, and which name plate must be clearly visible at the entrance to the premises where said home occupation is carried on and must be attached to the building wherein the home occupation is conducted.

5. There shall not be conducted on the premises the business of selling stocks of merchandise, supplies or products, provided that incidental retail sales may be made in connection with other permitted home occupations.

6. There shall be no exterior storage on the premises of material used in the home occupation nor of any highly explosive or combustible material.

7. There shall be no offensive noise, vibration, smoke, dust, odors, heat or glare noticeable at or beyond the property line.

8. A home occupation, including studios or rooms for instruction, shall provide an additional off-street parking area adequate to accommodate needs created by the home occupation of not less than two (2) parking spaces plus the parking spaces required for the dwelling unit. Such parking shall be provided on the same lot as the home occupation.

9. For the purposes of this section, provided all requirements contained herein are met, the following shall be considered home occupations:

    a. Professional and service offices;
    b. Art and photo studio;
    c. Dressmaking or millinery;
    d. Teaching, with musical instruction limited to two (2) pupils at a time;
    e. Tea room;
    f. Barber shop;
    g. Beauty shop;
    h. Antique shop;
    i. Other uses in the opinion of the Board of Adjustment which would not be detrimental.

Section 1210. Extended Home Occupation. There are significant differences between home occupations on small tracts and agricultural home occupations. The nature of resources available for use, the benefit and disadvantages created by home occupations, and the problems generated necessitate a distinction between small tract home occupations and farm home occupations. Each concept is based on supplementing income, but the districts in which each is practiced has unique characteristics. For the aforesaid reasons, different extended home occupations may be permitted on farms than are permitted on small tracts on five (5) acres or less.

1. For the purpose of this section, provided all requirements are met, the following shall be considered extended home occupations:

    a. Welding repair conducted in a safe manner;

    b. Veterinarian's office;

    c. Blacksmith;

    d. Service office;

    e. Others which, in the opinion of the Board of Adjustment would not conflict with adjoining land uses.

Section 1211. Animal Units on Small Acreages.

On parcels of ten (10) acres or less in the Lake Park District, a maximum of one (1) animal unit per acre will be allowed. Concentrated animal feeding operations with permit are excluded from this requirement.

Section 1212. Buildings Being Moved off County Zoned Property.

Any person desiring to move any building or structure in the County shall apply for a permit. The applicant shall also deposit with the County Zoning Officer an amount to be determined by the Board of County Commissioners. This deposit will be held until such time that the property is reclaimed to a clean and safe condition, and that any damage to utilities, roads, or other public or private property is compensated for. The applicant must furnish proof that all real estate taxes legally assessed and due against the property have been paid before any permit is granted.

Section 1213. Fireworks Retailer or Wholesalers.

The selling of fireworks shall require a permit from the County Zoning Officer. A long-term permit shall be required for the selling of fireworks for the period of May 1st to July 5th of any given year. A short-term permit shall be required to sell fireworks from June 27th to July 5th of any give year. All buildings shall be in compliance with all appropriate state regulations and are subject to inspection by any County officer.

Section 1214. On – and Off –Site Signs

1. No private sign shall be erected or maintained which:

    a. Creates a hazard due to collapse, fire, collision, decay, or abandonment; or

    b. Creates traffic hazards, by either:

i. Confusing or distracting motorists; or

ii. Impairing the driver's ability to see pedestrians, obstacles or other vehicles, or

iii. Impairing the driver's ability to see and interpret any official traffic sign, signal or device; or

iv. Creates a nuisance to persons using a public right-of-way; or

v. Constitutes a nuisance to occupancy of adjacent and contiguous property by its brightness, size, height, or movement

2. Signs shall be permitted in all zoning districts, subject to the following provisions:

   a. Wall signs may be located anywhere on the wall of a building.

   b. Freestanding signs shall not project over public property.

   c. Freestanding signs shall not be erected adjacent to a corner of two intersecting streets, unless such signs are constructed to not obstruct the view of said intersection.

   d. Each sign – size, lighting, and location - in the County shall at least meet the standards established by the South Dakota Department of Transportation.

   e. Other than utility fixtures or holiday decorations, no signs, awnings, or display shall be suspended, hanged, or placed so that the same shall hang over any part of a street or sidewalk, used for vehicular or pedestrian travel unless a written application for a permit is made to the County Zoning Officer and the said Official grants a permit therefore.

3. The Zoning Officer shall take into consideration factors that would make the proposed structure likely to endanger the property or personal safety of passerby traveling the streets or sidewalks in question, and whether or not such structure complies with National Building Code relating to outdoor advertising.

4. On-Site Signs: Each sign erected as an on-site sign in those districts where permitted shall have a maximum surface area of eighty (80) square feet and shall observe all yard and height requirements of the district in which it is located.

5. Off-Site Signs: Off-site signs erected in those districts where permitted shall conform to the following requirements:

   a. Each sign shall have a maximum surface area of one thousand two hundred (1,200) square feet, and maximum dimensions of thirty (30) feet in height, and forty (40) feet in length.

b. Each sign shall not be closer than three hundred (300) feet from any street intersection and five hundred (500) feet from another permitted off-site sign on the same side of the street or road.

c. Signs shall not be located within the street right-of-way.

Section 1215. Wind Energy System (Wes) Requirements

Section 1215.01 Applicability

The requirements of these regulations shall apply to all WES facilities except private non-commercial facilities with a single tower height of less than one-hundred forty (140) feet and used primarily for on-site consumption of power.

Section 1215.02 Federal and State Requirements

All WESs shall meet or exceed standards and regulations of the Federal Aviation Administration and South Dakota State Statutes and any other agency of federal or state government with the authority to regulate WESs.

Section 1215. Wind Energy System (Wes) Requirements

Section 1215.01 Applicability
The requirements of these regulations shall apply to all WES facilities except private non-commercial facilities with a single tower height of less than one-hundred forty (140) feet and used primarily for on-site consumption of power.

Section 1215.02 Federal and State Requirements

All WESs shall meet or exceed standards and regulations of the Federal Aviation Administration and South Dakota State Statutes and any other agency of federal or state government with the authority to regulate WESs.

Section 1215.03 General Provisions

1. Mitigation Measures

a. Site Clearance. The permittees shall disturb or clear the site only to the extent necessary to assure suitable access for construction, safe operation and maintenance of the WES.

b. Topsoil Protection. The permittees shall implement measures to protect and segregate topsoil from subsoil in cultivated lands unless otherwise negotiated with the affected landowner.

c. Compaction. The permittees shall implement measures to minimize compaction of all lands during all phases of the project's life and shall confine compaction to as small an area as practicable.

d. Livestock Protection. The permittees shall take precautions to protect livestock during all phases of the project's life.

e. Fences. The permittees shall promptly replace or repair all fences and gates removed or damaged during all phases of the project's life unless otherwise negotiated with the affected landowner.

f. Roads

i. Public Roads. Prior to commencement of construction, the permittees shall identify all state, county or township "haul roads" that will be used for the WES project and shall notify the state, county or township governing body having jurisdiction over the roads to determine if the haul roads identified are acceptable. The governmental body shall be given adequate time to inspect the haul roads prior to use of these haul roads. Where practical, existing roadways shall be used for all activities associated with the WES. Where practical, all-weather roads shall be used to deliver cement, turbines, towers, assemble nacelles and all other heavy components to and from the turbine sites.

ii. The permittees shall, prior to the use of approved haul roads, make satisfactory arrangements with the appropriate state, county or township governmental body having jurisdiction over approved haul roads for construction of the WES for the maintenance and repair of the haul roads that will be subject to extra wear and tear due to transportation of equipment and WES components. The permittees shall notify the County of such arrangements upon request of the County.

iii. Turbine Access Roads. Construction of turbine access roads shall be minimized. Access roads shall be low profile roads so that farming equipment can cross them and shall be covered with Class 5 gravel or similar material. When access roads are constructed across streams and drainageways, the access roads shall be designed in a manner so runoff from the upper portions of the watershed can readily flow to the lower portion of the watershed.

iv. Private Roads. The permittees shall promptly repair private roads or lanes damaged when moving equipment or when obtaining access to the site, unless otherwise negotiated with the affected landowner.

v. Control of Dust. The permittees shall utilize all reasonable measures and practices of construction to control dust.

vi. Soil Erosion and Sediment control Plan. The permittees shall develop a Soil Erosion and Sediment Control Plan prior to construction and submit the plan to the County. The Soil Erosion and Sediment Control Plan shall address the erosion control measures for each project phase, and shall at a minimum identify plans for grading, construction and drainage of roads and turbine pads; necessary soil information; detailed design features to maintain downstream water quality; a comprehensive revegetation plan to maintain and ensure adequate erosion control and slop stability and to restore the site after temporary project activities; and measures to minimize the area of surface disturbance. Other practices shall include containing excavated material, protecting exposed soil, stabilizing restored material and removal of silt fences or barriers when the area is stabilized. The plan shall identify methods for disposal or storage of excavated material.

2. Setbacks

Wind turbines shall meet the following minimum spacing requirements.

a. Distance 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 feet. Non-Participating property owners shall have the right to waive the respective setback requirements. For purposes of this section only, the term “business” does not include agricultural uses.

b. Distance from public right-of-way shall be one hundred and ten percent (110%) the height of the wind turbines, measured from the ground surface to the tip of the blade when in a fully vertical position.

c. Distance from any property line shall be one hundred and ten percent (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.

d. 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.

e. Distance from the municipalities Altamont, Astoria, Brandt and Goodwin of 1 mile from the nearest residence and 1 1/2 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.

3. Electromagnetic Interference. The permittees shall not operate the WES so as to

cause microwave, television, radio, or navigation interference contrary to Federal Communications Commission (FCC) regulations or other law. In the event such interference is caused by the WES or its operation, the permittees shall take the measures necessary to correct the problem.

4. Lighting. Towers shall be marked as required by the Federal Aviation Administration (FAA). There shall be no lights on the towers other than what is required by the FAA. This restriction shall not apply to infrared heating devices used to protect the monitoring equipment. Upon commencement of construction of a Tower, in cases where there are residential uses located within a distance which is three hundred (300) percent of the height of the Tower from the Tower and when required by federal law, dual mode lighting shall be requested from the FAA. Beacon lighting, unless required by FAA, shall not be utilized.

5. Turbine Spacing. The turbines shall be spaced no closer than is allowed by the turbine manufacturer in its approval of the turbine array for warranty purposes.

6. Footprint Minimization. The permittees shall design and construct the WES so as to minimize the amount of land that is impacted by the WES. Associated facilities in the vicinity of turbines such as electrical/electronic boxes, transformers and monitoring systems shall to the greatest extent feasible be mounted on the foundations used for turbine towers or inside the towers unless otherwise negotiated with the affected landowner.

7. Electrical Cables. The permittees shall place electrical lines, known as collectors, and communication cables underground when located on private property except when total distance of collectors from the substation require an overhead installation due to line loss of current from an underground installation. Collectors and cables shall also be placed within or immediately adjacent to the land necessary for turbine access roads unless otherwise negotiated with the affected landowner. This paragraph does not apply to feeder lines.

8. Feeder Lines. The permittees shall place overhead electric lines, known as feeders, on public rights-of-way if a public right-of-way exists. Changes in routes may be made as long as feeders remain on pubic rights-of-way and approval has been obtained from the governmental unit responsible for the affected right-of-way. If no public right-of-way exists, the permittees may place feeders on private property. When placing feeders on private property, the permittees shall place the feeder in accordance with the easement negotiated with the affected landowner. The permittees shall submit the site plan and engineering drawings for the feeder lines before commencing construction.

9. Decommissioning/Restoration/Abandonment

    a. Decommissioning Plan. Within 120 days of completion of construction, the permittees shall submit to the County a decommissioning plan describing

the manner in which the permittees anticipate decommissioning the project in accordance with the requirements of paragraph (b) below. The plan shall include a description of the manner in which the permittees will ensure that it has the financial capability to carry out these restoration requirements when they go into effect. The permittees shall ensure that it carries out its obligation to provide for the resources necessary to fulfill these requirements. The decommissioning plan shall include the requirement that Permittee post a bond or other adequate security sufficient to pay the entire cost of the decommission process.

b. Site Restoration. Upon expiration of this permit, or upon earlier termination of operation of the WES, the permittees shall have the obligation to dismantle and remove from the site all towers, turbine generators, transformers, overhead and underground cables, foundations, buildings and ancillary equipment to a depth of forty two (42) inches. To the extent possible the permittees shall restore and reclaim the site to its pre-project topography and topsoil quality. All access roads shall be removed unless written approval is given by the affected landowner requesting that one or more roads, or portions thereof, be retained. Any agreement for removal to a lesser depth or for no removal shall be recorded with the County and shall show the locations of all such foundations. All such agreements between the permittees and the affected landowner shall be submitted to the County prior to completion of restoration activities. The site shall be restored in accordance with the requirements of this condition within eighteen months after expiration.

10. Abandoned Turbines. The permittees shall advise the County of any turbines that are abandoned prior to termination of operation of the WES. The County may require the permittees to decommission any abandoned turbine.

11. Height from Ground Surface. The minimum height of blade tips, measured from ground surface when a blade is in fully vertical position, shall be twenty-five (25) feet.

12. Towers.

a. Color and Finish. The finish of the exterior surface shall be non-reflective and non-glass.

b. All towers shall be singular tubular design. With the exception of those towers identified in Section 12.15.01.

13. Noise & Shadow Flicker.

a. Noise level shall not exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing residences, for non-participating residences.

b. Limit for allowable shadow flicker at existing residences to no more than 30 hours annually.

14. Permit Expiration. The permit shall become void if no substantial construction has been completed within three (3) years of issuance.

15. Required Information for Permit.

a. Boundaries of the site proposed for WES and associated facilities on United States Geological Survey Map or other map as appropriate.
b. Map of easements for WES.
c. Copy of easement agreements with landowners.
d. Map of occupied residential structures, businesses and public buildings.
e. Map of sites for WES, access roads and utility lines.
f. Proof of utility right-of-way easement for access to transmission lines.
g. Location of other WES in general area.
h. Project schedule.

Section 1216. Wireless Telecommunications Towers And Facilities

Section 1216.01 Purpose

The general purpose of this Section is to regulate the placement, construction, and modification of Towers and Telecommunications Facilities in order to protect the health, safety, and welfare of the public, while at the same time not unreasonably interfering with the development of the competitive wireless telecommunications marketplace in the County.

Specifically, the purposes of this Ordinance are:

1. To regulate the location of Towers and Telecommunications Facilities in the County;

2. To protect residential areas and land uses from potential adverse impact of Towers and Telecommunications Facilities;

3. To minimize adverse visual impact of Towers and Telecommunications Facilities through careful design, siting, landscaping, and innovative camouflaging techniques;

4. To promote and encourage shared use/co-location of Towers and Antenna Support Structures as a primary option rather than construction of additional single-use Towers;
5. To promote and encourage utilization of technological designs that will either eliminate or reduce the need for erection of new Tower structures to support antenna and Telecommunications Facilities;

6. To avoid potential damage to property caused by Towers and Telecommunications Facilities by ensuring such structures are soundly and carefully designed, constructed, modified, maintained, and removed when no longer used or are determined to be structurally unsound; and

7. To ensure that Towers and Telecommunications Facilities are compatible with surrounding land uses.

Section 1216.02 Definitions

The following words, terms, and phrases, when used in this Section, shall have the meanings ascribed to them in this Section, except where the context clearly indicates a different meaning:

1. *Antenna Support Structure* means any building or structure other than a Tower which can be used for location of Telecommunications Facilities.

2. *Applicant* means any Person that applies for a Tower development permit.

3. *Application* means the process by which the Owner of a parcel of land within the County submits a request to develop, construct, build, modify, or erect a Tower upon such parcel of land. Application includes all written documentation, verbal statements, and representations, in whatever form or forum, made by an Applicant to the County concerning such a request.

4. *Engineer* means any engineer licensed by the State of South Dakota.

5. *Owner* means any Person with fee title or a long-term (exceeding ten (10) years) leasehold to any parcel of land within the County who desires to develop, or construct, build, modify, or erect a Tower upon such parcel of land.

6. *Person* is any natural person, firm, partnership, association, corporation, company, or other legal entity, private or public, whether for profit or not for profit.

7. S*tealth* means any Tower or Telecommunications Facility which is designed to enhance compatibility with adjacent land uses, including, but not limited to, architecturally screened roof-mounted antennas, antennas integrated into architectural elements, and Towers designed to look other than like a Tower such as light poles, power poles, and trees. The term Stealth does not necessarily exclude the use of uncamouflaged lattice, guyed, or monopole Tower designs.

8. T*elecommunications Facilities* means any cables, wires, lines, wave guides, antennas, and any other equipment or facilities associated with the transmission or reception of communications which a Person seeks to locate or has installed upon or near a Tower or Antenna Support Structure. However, Telecommunications Facilities shall not include:

    a. Any satellite earth station antenna two (2) meters in diameter or less which is located in an area zoned industrial or commercial; or

    b. Any satellite earth station antenna one (1) meter or less in diameter, regardless of zoning category.

9. *Tower* means a self-supporting lattice, guyed, or monopole structure constructed from grade which supports Telecommunications Facilities. The term Tower shall not include amateur radio operators' equipment, as licensed by the FCC.

Section 1216.03 Development of Towers

1. Towers are exempt from the maximum height restrictions of the districts where located. Towers shall be permitted to a height of one hundred and fifty (150) feet. Towers may be permitted in excess of one hundred and fifty (150) feet in accordance with "Criteria for Site Plan Development Modifications."

2. No new Tower shall be built, constructed, or erected in the County unless the Tower is capable of supporting three other Persons' operating Tele-communications Facilities comparable in weight, size, and surface area to the Telecommunications Facilities installed by the Applicant on the Tower within six (6) months of the completion of the Tower construction. No tower shall charge co-location fees in excess of commercially reasonable industry amounts. Each tower constructed shall upon the request of Deuel County mount law-enforcement or public safety communications apparatus.

3. An Application to develop a Tower shall include:

    a. The name, address, and telephone number of the Owner and lessee of the parcel of land upon which the Tower is situated. If the Applicant is not the Owner of the parcel of land upon which the Tower is situated, the written consent of the Owner shall be evidenced in the Application.

b. The legal description, folio number, and address of the parcel of land upon which the Tower is situated.

c. The names, addresses, and telephone numbers of all owners of other Towers or usable Antenna Support Structures within a one-half (½) mile radius of the proposed new Tower site, including County-owned property.

d. A description of the design plan proposed by the Applicant. Applicant must identify its utilization of the most recent technological design, including microcell design, as part of the design plan. The Applicant must demonstrate the need for Towers and why design alternatives, such as the use of microcell, cannot be utilized to accomplish the provision of the Applicant's telecommunications services.

e. An affidavit attesting to the fact that the Applicant made diligent, but unsuccessful, efforts to install or co-locate the Applicant's Telecommunications Facilities on Towers or usable Antenna Support Structures owned by other Persons located within a one-half (½) mile radius of the proposed Tower site. In the event that one reason for the unsuccessful efforts to install or co-locate is that fees to be charged are not commercially reasonable, an explanation shall be provided why said charges are commercially unreasonable.

f. Written technical evidence from an Engineer(s) that the proposed Tower or Telecommunications Facilities cannot be installed or co-located on another person's Tower or usable Antenna Support Structures owned by other Persons located within one-half (½) mile radius of the proposed Tower site.

g. A written statement from an Engineer(s) that the construction and placement of the Tower will not interfere with public safety communications and the usual and customary transmission or reception of radio, television, or other communications services enjoyed by adjacent residential and non-residential properties.

h. Written, technical evidence from an Engineer(s) that the proposed structure meets the standards set forth in, "Structural Requirements," of this Ordinance.

i. Written, technical evidence from a qualified Engineer(s) acceptable to the Fire Marshall and the building official that the proposed site of the Tower or Telecommunications Facilities does not pose a risk of explosion, fire, or other danger to life or property due to its proximity to volatile, flammable, explosive, or hazardous materials such as LP gas, propane, gasoline, natural gas, or corrosive or other dangerous chemicals.

j. The FCC has sole jurisdiction of the field of regulation of RF emissions and does not allow the County to condition or deny on the basis of RF impacts the approval of any Telecommunications Facilities (whether mounted on Towers or Antenna Support Structures) which meet FCC standards. In order to provide information to its citizens, the County shall make available upon request copies of ongoing FCC information

and RF emission standards for Telecommunications Facilities transmitting from Towers or Antenna Support Structures. Applicants shall be required to submit information on the proposed power density of their proposed Telecommunications Facilities and demonstrate how this meets FCC standards.

k. No application shall be accepted from landowners or on property on which there are current or past unresolved violations outstanding.

4. The Board of Adjustment may require an Applicant to supplement any information that the Board considers inadequate or that the Applicant has failed to supply. The Board of Adjustment may deny an Application on the basis that the Applicant has not satisfactorily supplied the information required in this subsection. Applications shall be reviewed by the Board in a prompt manner and all decisions shall be supported in writing setting forth the reasons for approval or denial.

Section 1216.04 Setbacks

1. All Towers up to one-hundred (100) feet in height shall be set back on all sides a distance equal to the underlying setback requirement in the applicable zoning district.

2. Towers in excess of one hundred (100) feet in height shall meet the following:

   a. Distance from existing off-site residences, business and public buildings shall be one thousand (1,000) feet. Distance from on-site or lessor's residence shall be five hundred (500) feet.

   b. Distance from public right-of-way shall be the height of the tower.

   c. Distance from any property line shall be the height of the tower.

3. Setback requirements for Towers shall be measured from the base of the Tower to the property line of the parcel of land on which it is located.

4. Setback requirements may be modified, as provided in, when placement of a Tower in a location which will reduce the visual impact can be accomplished. For example, adjacent to trees which may visually hide the Tower.

Section 1216.05 Structural Requirements

All Towers must be designed and certified by an Engineer to be structurally sound and, at minimum, in conformance with the Building Code, and any other standards outlined in this Ordinance. All Towers in operation shall be fixed to land.

Section 1216.06 Separation or Buffer Requirements

For the purpose of this Section, the separation distances between Towers shall be measured by drawing or following a straight line between the base of the existing or approved structure and the proposed base, pursuant to a site plan of the proposed Tower.

Proposed Towers must meet the following minimum separation requirements from existing towers or towers which have a development permit but are not yet constructed at the time a development permit is granted pursuant to this Ordinance:

1. Monopole Tower structures shall be separated from all other Towers, whether monopole, self-supporting lattice, or guyed, by a minimum of seven hundred and fifty (750) feet.

2. Self-supporting lattice or guyed Tower structures shall be separated from all other self-supporting or guyed Towers by a minimum of fifteen hundred (1,500) feet.

3. Self-supporting lattice or guyed Tower structures shall be separated from all monopole Towers by a minimum of seven hundred and fifty (750) feet.

Section 1216.07 Method Of Determining Tower Height

Measurement of Tower height for the purpose of determining compliance with all requirements of this Section shall include the Tower structure itself, the base pad, and any other Telecommunications Facilities attached thereto which extend more than twenty (20) feet over the top of the Tower structure itself. Tower height shall be measured from grade.

Section 1216.08 Illumination

Towers shall not be artificially lighted except as required by the Federal Aviation Administration (FAA). Upon commencement of construction of a Tower, in cases where there are residential uses located within a distance which is three hundred (300) percent of the height of the Tower from the Tower and when required by federal law, dual mode lighting shall be requested from the FAA. Beacon lighting, unless required by FAA, shall not be utilized.

Section 1612.09 Exterior Finish

Towers not requiring FAA painting or marking shall have an exterior finish which enhances compatibility with adjacent land uses, as approved by the appropriate reviewing body.

Section 1216.10 Modification Of Towers

1. A Tower existing prior to the effective date of this Ordinance, which was in compliance with the County's zoning regulations immediately prior to the effective date of this Ordinance, may continue in existence as a nonconforming structure. Such non-

conforming structures may be modified or demolished and rebuilt without complying with any of the additional requirements of this Section, except for Sections "Separation or Buffer Requirements", "Certification and Inspections", and "Maintenance," provided:

a. The Tower is being modified or demolished and rebuilt for the sole purpose of accommodating, within six (6) months of the completion of the modification or rebuild, additional Telecommunications Facilities comparable in weight, size, and surface area to the discrete operating Telecommunications Facilities of any Person currently installed on the Tower.

b. An Application for a development permit is made to the Board of Adjustment which shall have the authority to issue a development permit without further approval. The granting of a development permit pursuant to this Section allowing the modification or demolition and rebuild of an existing nonconforming Tower shall not be considered a determination that the modified or demolished and rebuilt Tower is conforming.

c. The height of the modified or rebuilt Tower and Telecommunications Facilities attached thereto do not exceed the maximum height allowed under this Ordinance.

Section 1216.11 Certifications And Inspections

1. All Towers shall be certified by an Engineer to be structurally sound and in conformance with the requirements of this ordinance and all other construction standards set forth by federal and state law. For new monopole Towers, such certification shall be submitted with an Application pursuant to of this Ordinance and every five (5) years thereafter. For new lattice or guyed Towers, such certification shall be submitted with an Application pursuant to this Ordinance and every two (2) years thereafter. The Tower owner may be required by the County to submit more frequent certifications should there be reason to believe that the structural and electrical integrity of the Tower is jeopardized.

2. The County or its agents shall have authority to enter onto the property upon which a Tower is located, between the inspections and certifications required above, to inspect the Tower for the purpose of determining whether it complies with this ordinance and all other construction standards provided by federal and state law.

3. The County reserves the right to conduct such inspections at any time, upon reasonable notice to the Tower owner. All expenses related to such inspections by the County shall be borne by the Tower owner.

Section 1216.12 Maintenance

1. Tower owners shall at all times employ ordinary and reasonable care and shall install and maintain in use nothing less than commonly accepted methods and devices for preventing failures and accidents which are likely to cause damage, injuries, or nuisances to the public.

2. Tower owners shall install and maintain Towers, Telecommunications Facilities, wires, cables, fixtures, and other equipment in substantial compliance with the requirements of the National Electric Safety Code and all FCC, state, and local regulations, and in such manner that will not interfere with the use of other property.

3. All Towers, Telecommunications Facilities, and Antenna Support Structures shall at all times be kept and maintained in good condition, order, and repair so that the same shall not menace or endanger the life or property of any Person.

4. The property in which Towers, Telecommunications Facilities, and Antenna Support Structures are situated shall be maintained in a manner to control noxious weeds.

5. All maintenance or construction of Towers, Telecommunications Facilities, or Antenna Support Structures shall be performed by licensed maintenance and construction personnel.

6. All Towers shall maintain compliance with current RF emission standards of the FCC.

7. In the event that the use of a Tower is discontinued by the Tower owner, the Tower owner shall provide written notice to the County of its intent to discontinue use and the date when the use shall be discontinued.

Section 1216.13 Criteria For Site Plan Development Modifications

1. Notwithstanding the Tower requirements provided in this Ordinance, a modification to the requirements may be approved by the Board of Adjustment as a special exception in accordance with the following:

    a. In addition to the requirement for a Tower Application, the Application for modification shall include the following:

        i. A description of how the plan addresses any adverse impact that might occur as a result of approving the modification.

        ii. A description of off-site or on-site factors which mitigate any adverse impacts which might occur as a result of the modification.

        iii. A technical study that documents and supports the criteria submitted by the Applicant upon which the request for modification is based. The technical study

shall be certified by an Engineer and shall document the existence of the facts related to the proposed modifications and its relationship to surrounding rights-of-way and properties.

iv. For a modification of the setback requirement, the Application shall identify all parcels of land where the proposed Tower could be located, attempts by the Applicant to contract and negotiate an agreement for co-location, and the result of such attempts.

v. The Board of Adjustment may require the Application to be reviewed by an independent Engineer under contract to the County to determine whether the antenna study supports the basis for the modification requested. The cost of review by the County's Engineer shall be reimbursed to the County by the Applicant.

2. The Board of Adjustment shall consider the Application for modification based on the following criteria:

   a. That the Tower as modified will be compatible with and not adversely impact the character and integrity of surrounding properties.

   b. Off-site or on-site conditions exist which mitigate the adverse impacts, if any, created by the modification.

   c. In addition, the board may include conditions on the site where the Tower is to be located if such conditions are necessary to preserve the character and integrity of the neighborhoods affected by the proposed Tower and mitigate any adverse impacts which arise in connection with the approval of the modification.

3. In addition to the requirements of subparagraph (2) of this Section, in the following cases, the Applicant must also demonstrate, with written evidence, the following:

   a. In the case of a requested modification to the setback requirement, that the setback requirement cannot be met on the parcel of land upon which the Tower is proposed to be located and the alternative for the Person is to locate the Tower at another site which is closer in proximity to a residentially zoned land.

   b. In the case of a request for modification of the separation and buffer requirements from residential use of land of, if the Person provides written technical evidence from an Engineer(s) that the proposed Tower and Telecommunications Facilities must be located at the proposed site in order to meet the coverage requirements of the Applicant's wireless communications system and if the Person is willing to create approved landscaping and other buffers to screen the Tower from being visible to residentially used property.

c. In the case of a request for modification of the height limit for Towers and Telecommunications Facilities or to the minimum height requirements for Antenna Support Structures, that the modification is necessary to:

i. Facilitate co-location of Telecommunications Facilities in order to avoid construction of a new Tower; or

ii. To meet the coverage requirements of the Applicant's wireless communications system, which requirements must be documented with written, technical evidence from an Engineer(s) that demonstrates that the height of the proposed Tower is the minimum height required to function satisfactorily, and no Tower that is taller than such minimum height shall be approved.

Section 1216.14 Abandonment

1. If any Tower shall cease to be used for a period of 365 consecutive days, the Planning and Zoning Commission shall notify the Owner, with a copy to the Applicant, that the site will be subject to a determination by the Planning and Zoning Commission that such site has been abandoned. The Owner shall have thirty (30) days from receipt of said notice to show, by a preponderance of the evidence, that the Tower has been in use or under repair during the period. If the Owner fails to show that the Tower has been in use or under repair during the period, the Planning and Zoning Commission shall issue a final determination of abandonment for the site. Upon issuance of the final determination of abandonment, the Owner shall, within seventy-five (75) days, dismantle and remove the Tower.

2. To secure the obligation set forth in this Section, the Applicant [and/or Owner] may be required to post a bond.

ARTICLE XIII

CONCENTRATED ANIMAL FEEDING OPERATION REGULATIONS

Section 1300. Intent

An adequate supply of healthy livestock, poultry and other animals is essential to the well-being of county citizens and the State of South Dakota. However, livestock, poultry, and other animals produce manure which may, where improperly stored, transported, or disposed, negatively affect the County's environment. Animal manure must be controlled where it may add to air, surface water, ground water, or land pollution. The following regulations have been adopted to provide protection against pollution caused by manure from domesticated animals. All new and proposed expansions of Concentrated Animal Feeding Operations shall comply with the regulations as outlined herein.

It is the intention of the Board of Adjustment in the enforcement of this ordinance that when an operator of an existing Concentrated Animal Feeding Operation applies for a permit to expand to another class level, the standards that apply to the expansion will not be applied to existing structures that were built in compliance with accepted industry standards in existence at the time of the construction of such facilities.

Section 1301. Animal Units

Animal species and number of a species required to equal 500, 1,000 and 2,000 animal units. Note that these figures relate to inventory rather than annual production. Other animal species equivalents which are not listed will be based on species' waste production.

	EQUIVALENT NUMBER OF A SPECIES TO EQUAL:			
ANIMAL SPECIES	500 AU	1,000 AU	2,000 AU	ANIMAL UNIT EQUIVALENT SPECIES/AU
Feeder or Slaughter Cattle	500 hd	1,000 hd	2,000 hd	1.0
Mature Dairy Cattle	357 hd	700 hd	1,400 hd	1.43
Finisher Swine (over 55 lbs)	1,250 hd	2,500 hd	5,000 hd	0.4
Nursery Swine (less than 55 lbs)	5,000 hd	10,000 hd	20,000 hd	0.1
Farrow-to-Finish (sows)	135 hd	270 hd	540 hd	3.7
Swine Production Unit (Sows Breeding, Gestating & Farrowing)	1,064 hd	2,130 hd	4,260 hd	0.47
Horses	250 hd	500 hd	1,000 hd	2.0
Sheep	5,000 hd	10,000 hd	20,000 hd	0.1
Turkeys	27,800 hd	55,000 hd	110,000 hd	0.018
Laying Hens and Broilers (continuous overflow watering in facility)	50,000 hd	100,000 hd	200,000 hd	0.01
Laying Hens and Broilers (liquid handling system in confinement facility)	15,150 hd	30,000 hd	60,000 hd	0.033
Ducks	2,500 hd	5,000 hd	10,000 hd	0.2

Section 1302. Classes of Concentrated Animal Feeding Operations

For the purpose of these regulations, Concentrated Animal Feeding Operations are divided into the following classes:

	ANIMAL UNITS	
Class A	2,000 or more	
Class B	1,000 to 1,999	
Class C	500 to 999	
Class D	50 to 499	(Potential water pollution hazard)
Class E	50 to 499	(No pollution hazard)

Section 1303. Concentrated Animal Feeding Operation Permit Requirements

Owners of Class A, Class B, Class C, and Class D Concentrated Animal Feeding Operations are required to complete a permit application as follows:

1. A new concentrated animal feeding operation is proposed where one does not exist.

2. An expansion is proposed beyond what a current permit allows.

3. An expansion of an existing, non-permitted concentrated animal feeding operation after June 3, 1997, which would result in the creation of either a Class A, B, C, or D concentrated animal feeding operation

4. A change in ownership of a Class A or Class B concentrated animal feeding operation. This requirement does not apply if the transfer of ownership is between family members with one degree of consanguinity.

6. An existing concentrated animal feeding operation is to be restocked after being idle for five (5) years.

7. A signed complaint has been received by the County Zoning Officer or South Dakota Department of Environment and Natural Resources and after inspection reveals that the Concentrated Animal Feeding Operation is in violation of County or State regulations.

Section 1304. Concentrated Animal Feeding Operation Control Requirements

1. No Significant Contribution of Pollution

In general, no Concentrated Animal Feeding Operation shall be constructed, located, or operated so as to create a significant contribution of pollution.

2. State General Permit

Classes A and B Concentrated Animal Feeding Operations shall obtain a State General Permit pertaining to the animal species of the Concentrated Animal Feeding Operation. A County permit may be approved conditioned on receiving a State permit.

Classes C and D Concentrated Animal Feeding Operations will be required to obtain a State General Permit if the following occur:

a. If an earthen storage basin or lagoon is used for manure storage, excluding existing operations that are improving waste handling facilities according to Natural Resource Conservation Service standards.

b. The Board of Adjustment decides conditions require a State permit.

3. Nutrient Management Plan.

Classes A, B, C, and D Concentrated Animal Feeding Operations are required to have a nutrient management plan. The applicant shall develop, maintain, and follow a nutrient management plan to ensure safe disposal of manure and protection of surface and ground water. The South Dakota Department of Environment & Natural Resources must approve the plan prior to land application of any wastes. Due to crop rotation, site changes, and other operational changes, the producer should update the plan annually to reflect the current operation and crops grown on the application sites. The applicant shall collect, store, and dispose of liquid and solid manure according to recognized practices of good agricultural management.

A generic nutrient management plan that the applicant may use in developing a nutrient management plan is available from the South Dakota Department of Environment & Natural Resources. The generic nutrient management plan is based on application of nitrogen. The applicant may use other plans, provided the alternate plan contains all the information necessary to determine compliance with conditions of this general permit. Nitrogen, in addition to that allowed in the nutrient management plan, may be applied up to the amounts as indicated by soil or crop nitrogen test results that are necessary to obtain the realistic crop yield.

The South Dakota Department of Environment & Natural Resources recommends and encourages producers to develop nutrient management plans for other nutrients such as phosphorous and potassium. Over application of these nutrients may lead to water quality problems in area lakes and streams and result in potential damage to the producer's land and crop.

The applicant must maintain records to show compliance with the plan.

The plan must comply with County Manure Application Setbacks.

Land spreading agreements shall be provided if applicant does not have minimum acreage to apply animal manure.

4. Manure Management and Operation Plan

Classes A, B, C, and D Concentrated Animal Feeding Operations must submit a Manure Management and Operation Plan.

A. Plan must include:

1. The location and specifics of proposed animal manure facilities.

2. The operation procedures and maintenance of manure facilities.

3. Plans and specifications must be prepared or approved by a registered professional engineer, or a Natural Resource Conservation Service (NRCS) engineer. Waste treatment facilities will require inspection by an engineer and as-built plans to be submitted to the County Zoning Officer.

4. Animal manure shall not be stored longer than two years.

5. Manure containment structures shall provide for a minimum design volume of three hundred sixty-five (365)days of storage.

6. Producers shall keep records on manure applications on individual fields which document acceptable manure and nutrient management practices have been followed. These records shall include soils test results for surface two feet of soil, actual and projected crop yields, nutrient analysis of manure, and information about date, rate and method of manure applications for individual fields.

B. As a condition of the permit, the County Board of Adjustment may require the producer to participate in environmental training programs and become a certified livestock manager.

5. Management Plan for Fly and Odor Control

Classes A, B, C, and D Concentrated Animal Feeding Operations shall dispose of dead animals, manure and wastewater in such a manner as to control odors or flies. A management plan is required for submission of a permit. The County Board of Adjustment will review the need for control measures on a site specific basis, taking into consideration prevailing wind direction and topography. The following procedures to control flies and odors should be considered in a management control plan.

A. Operational plans for manure collection, storage treatment and use must be kept updated and implemented.

B. Methods to be utilized to dispose of dead animals should be included in the management plan.

C. Plant trees and shrubs to reduce wind movement of odors away from buildings, manure storage ponds and/or lagoons.

D. Provide adequate slope and drainage to remove surface water from pens and keep pen area dry so odor production is minimized.

E. Store solid manure in containment areas having good drainage to minimize odor production.

F. Consider use of covers on open storage systems for liquid manure systems to reduce odor production.

G. Avoid spreading manure on weekends, holidays and evenings during warm season when neighbors may be involved in outdoor recreation activities.

H. Avoid spreading during calm and humid days, since these conditions restrict the dispersion and dilution of odors.

6. Required Setbacks and Separation Distance for New Concentrated Animal Feeding Operations and those Existing, Non-permitted Concentrated Animal Feeding operations expanding into a Class A, B, C, or D Concentrated animal Feeding Operations Expanding after June 3, 1997.

	MINIMUMS			
	CLASS A	CLASS B	CLASS C	CLASS D & E
Established Residences	2,640 feet	1,760 feet	1,320 feet	1,320 feet
Churches, Businesses and Commercially Zoned Areas	2,640 feet	2,640 feet	1,320 feet	1,320 feet
Incorporated Municipality Limits	5,280 feet Plus 440 ft. For each Addnl 1,000 A.U. over 2,000 A.U.	5,280 feet	2,640 feet	1,320 feet
Private Wells other than the operator	2,640 feet	1,760 feet	1,320 feet	1,320 feet
Lakes and Streams classified as Fisheries as identified by the State	500 feet	500 feet	200 feet	200 feet
Federal, State & County Road ROW Confinement	300 feet	300 feet	200 feet	200 feet
Federal, State & County Road ROW Open Lot	150 feet	150 feet	150 feet	150 feet
Township Road ROW Confinement	150 feet	150 feet	150 feet	150 feet
Township Road ROW Open Lot	150 feet	150 feet	150 feet	150 feet

7. Exemptions to Separation Distance Requirements

A. A Concentrated Animal Feeding Operation constructed prior to June 3, 1997, which does not comply with the ~~distance~~ setback requirements, which continues to operate, but is not expanded by more than three hundred (300) animal units.

B. A Concentrated Animal Feeding Operation structure which is expanded or constructed, if the title holder of the land benefiting from the distance separation

requirement executes a written waiver with the title holder of the land where the structure is located, under such terms and conditions which the parties may negotiate. The written waiver becomes effective only upon the recording of the waiver in the office of the Register of Deeds in the county. The benefited land is the residence, commercial enterprise, bonafide religious institution, educational institution from which separation is required.

C. A Concentrated Animal Feeding Operation structure which is located within any distance from an educational institution, commercial enterprise, bonafide religious institution, incorporated community, if the educational institution, commercial enterprise or bonafide institution was constructed or expanded or the boundaries of the incorporated community were expanded, after the date that the animal feeding operation was established. The date that the Concentrated Animal feeding Operation was established is the date on which the Concentrated Animal Feeding Operation commenced operating. A change in ownership or expansion shall not change the date of operation.

8. Each application for a new or expanded Concentrated Animal Feeding Operation (CAFO) will be reviewed by the Board of Adjustment on a site-specific basis. The Board of Adjustment reserves the right to increase or decrease the minimum required setbacks and separation distance on a site specific review, based on one or more of the following considerations.

<u>Considerations To Increase Setbacks And/or Separation Distances</u>

A. A concentration of CAFOs in the area exists or would occur which may pose an air or water quality concern.

B. Due to topography and prevailing wind direction, additional setback and separation distance is appropriate to safeguard air or water quality.

C. A Concentrated Animal Feeding Operation is in excess of 5,000 animal units.

Considerations To Decrease Setbacks And Separation Distances

A. An existing Concentrated Animal Feeding Operation proposes to expand but does not meet suggested setback or separation distances, the Board of Adjustment may reduce suggested setbacks and separation distances after:

i. Review of past management practices and proposed improvements to waste handling facilities.

ii. Due to the type of waste handling and management of the CAFO little or no impact on adjacent property is expected.

iii. Due to topography and/or prevailing wind direction little or no impact on adjacent property is expected.

iv. Due to the limited number of animal units no adverse impacts are expected.

9. Manure Application Setbacks

A. The following manure application setbacks apply to all classes of Concentrated Animal Feeding Operations.

COUNTY MANURE APPLICATION SETBACKS

CATEGORY	SURFACE OR IRRIGATION APPLIED	INCORPORATED OR INJECTED
Lake, Rivers and Streams Classified as Fisheries	300 feet	100 feet (lake) 50 feet (river & stream)
Streams and Lakes classified as Drinking Water Supplies	1000 feet	300 feet
Public Roads	25 feet (surface) from right-of-way 300 feet (irrigation)	10 feet from right-of-way
Area of 10 or more Residences	300 feet (surface) 1,000 feet (irrigation)	300 feet
Public Wells	1000 feet	1000 feet
Private Shallow Wells	250 feet	250 feet
A Residence other than the Operator	300 feet (surface) 1,000 feet (irrigation)	300 feet
Natural or Manmade Drainage	200 feet	50 feet

B. The County Board of Adjustment may require liquid manure to be incorporated or injected in order to minimize air and water quality impacts.

C. Requests for application of liquid manure by means of irrigation will be reviewed by the Board of Adjustment on a site-specific basis. Impact on air and water quality will be taken into consideration.

10. Standards for Special Exceptions

A. The County Board of Adjustment may request information relating to a Concentrated Animal Feeding Operation not contained in these regulations.

B. The County Board of Adjustment may impose, in addition to the standards and requirements set forth in these regulations additional conditions which the Board of Adjustment considers necessary to protect the public health, safety and welfare.

C. Special exceptions shall be in effect only as long as sufficient land specified for spreading purposes is available for such purposes and other provisions of the permit are being adhered to.

D. When considering an application, the County Board of Adjustment will take into consideration current and past violations relating to Concentrated Animal Feeding Operations that the applicant has an interest in.

E. Permit applicants will be required to file a letter of assurances as required by the Board of Adjustment. The letter of assurances will be prepared by the zoning officer and signed by both the applicant and the zoning officer.

11. Information Required for Class A and B Concentrated Animal Feeding Operation Permit.

A. Owner's name, address and telephone number.

B. Legal descriptions of site and site plan.

C. Number and type of animals.

D. Nutrient management plan.

E. Manure management and operation plan.

F. Management plan for fly and odor control.

G. Information on ability to meet designated setback requirements including site plan to scale.

H. General permit from South Dakota Department of Environment & Natural Resources if available for animal species.

I. Review of plans and specifications and nutrient management plan by the South Dakota Department of Environment & Natural Resources.

J. Information on soils, shallow aquifers, designated wellhead protection areas, and 100-year floodplain designation.

K. Notification of whomever maintains the access road (township, county and state). Notification of public water supply officials.

L. Any other information as contained in the application and requested by the County Zoning Officer.

12. Information Required for Class C, and Class D Concentrated Animal Feeding Operation Permit.

A. Owner's name, address and telephone number.

B. Legal descriptions of site and site plan.

C. Number and type of animals.

D. Nutrient management plan.

E. Manure management and operation plan.

F. Management plan for fly and odor control.

G. Information on ability to meet designated setback requirements, including site plan to scale.

H. Review of plans and specifications and nutrient management plan by the South Dakota Department of Environment & Natural Resources if using lagoon or earthen storage basin.

I. Information on soils, shallow aquifers, designated wellhead protection areas, and 100-year floodplain designation.

J. Notification of whomever maintains the access road (township, county and state). Notification of public water supply officials.

K. Any other information as contained in the application and requested by the County Zoning Officer.

Appendix Q

Decommissioning Plan

Wind Project Decommissioning Plan

Tatanka Ridge Wind Project

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

May 2019

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
952.832.2600
www.barr.com

Tatanka Ridge Wind Project Decommissioning Plan

May 2019

Contents

1.0 Introduction 1
1.1 Wind Farm Components 1
1.2 Expected Lifetime and Triggering Events 1
1.3 Decommissioning Sequence 2
2.0 Decommissioning Components and Activities 4
2.1 Wind Farm System Overview 4
2.2 Wind Turbine Generators 4
2.3 Step-Up Transformers 5
2.4 Wind Turbine Foundations 5
2.5 Collection System 6
2.6 Crane Pads 6
2.7 Access Roads 6
2.8 Project Substation 7
2.9 Topsoil Restoration and Revegetation 7
3.0 Decommissioning Cost Estimate Summary 8
3.1 Decommissioning Expenses and Revenues 8
3.2 Net Decommissioning Cost Summary 10
3.3 Financial Assurance 10
3.4 Salvage Value 10
3.4.1 Pricing assumptions 11
3.5 Markups 11
3.6 Escalation Rate 11
3.7 Estimate Classification 12
3.8 Cost Resources 12
3.9 Estimate Methodology 12
3.10 Labor Costs 12
3.11 Sales Tax 12
3.12 Soft Costs 12
3.13 Major Assumptions 12

3.14 Excluded Costs 14
4.0 Referenced Documents 15

List of Tables

Table 1 Primary Components of Wind Farm to be Decommissioned....4
Table 2 Typical Access Road Construction Materials....7
Table 3 Estimated Decommissioning Expenses and Revenues....9
Table 4 Net Decommissioning Summary....10

List of Figures

Figure 1 Project Location
Figure 2 Site Layout

Certifications

Joel Bahma, PE

May 21, 2019
Date

1.0 Introduction

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota (Figure 1). The proposed project will generate up to 155 megawatts (MW) of electricity at rated capacity and will include construction of up to 56 turbines a combination of GE 2.82-127 and GE 2.3-116 wind turbine generators (WTG or turbine) Figure 2 shows the site layout.

This Decommissioning Plan report 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. A summary of estimated costs and revenues associated with the decommissioning phase is also included.

1.1 Wind Farm Components

The main components of the proposed Project include:

- Turbines (tower, nacelle, hub, rotor, and three rotor blades per WTG)
- Turbine foundations
- Step-up transformers
- Access roads
- Crane pads
- Electrical collection system
- Meteorological (MET) tower
- Substation equipment and foundations
- Operation and maintenance (O&M) buildings and foundations

1.2 Expected Lifetime and Triggering Events

The anticipated Project life is 40 years from the date of construction. Depending on market conditions and Project viability, the turbines may be refitted with updated components, such as nacelles, towers, and/or blades to extend the life of the Project. In the event that the turbines are not retrofitted, or at the end of the Project's useful life, the turbines and associated components will be decommissioned and removed from the site.

Turbine components that have resale value may be sold in the wholesale market. Components with no wholesale value will be salvaged and sold as scrap for recycling or disposed at an offsite licensed solid waste disposal facility (e.g., landfill). Decommissioning activities will include removal of the turbines and associated components as listed in Section 1.1 and described in Section 2.

1.3 Decommissioning Sequence

Decommissioning activities are anticipated to be completed in an 18-month timeframe. Monitoring and site restoration may extend beyond this period to ensure successful revegetation and rehabilitation. The anticipated sequence of decommissioning and removal is described as follows; however, overlap of activities is expected:

- Conduct site investigation
- Contact land owners
- Conduct access assessment
- Conduct public road condition assessment
- Conduct site access road assessment
- Complete decommissioning permits application and notification
- Prepare site by site decommissioning sequence and schedule
- Negotiate decommissioning contractor terms and conditions
- Obtain necessary permits and approvals
- Provide Notice to Proceed for Decommissioning Contractor
    - Mobilize and prepare field staff yard and offices
    - Mobilize construction equipment (cranes, lowboys, graders, utility trucks, etc.)
    - Begin site access road maintenance and, where necessary, apply crushed rock to facilitate equipment access
    - Identify and secure laydown area at each site to process decommissioned equipment and material
    - Disconnect and secure electrical equipment from public power grid
    - Secure rotating machinery in preparation of disassembly
    - Begin fluid removal and processing
    - Mobilize crane(s)
    - Remove blades and place in laydown area for site processing
    - Remove nacelle and place in laydown area for processing. or alternately, load directly to shipping and move to remote site for processing

- Disassemble tower and place in laydown area for site processing
- Mobilize crane to next site (this may be overland if possible to negotiate with land owners to speed disassembly and avoid multiple over road transport and erection operations)
- Process blades and load for disposal/recycle
- Process tower and load for transport to scrap yard
- Remove underground cable where surfaced
- Remove tower foundation to a depth of 42 inches below final grade using approved means and methods
- Haul tower foundation material to disposal site for reprocessing (concrete to be crushed, rebar for recycle)
- Remove access road and surfacing (gravel) where required
- Haul surfacing material to approved stockpile for reclaim or sale
- Regrade site to appropriate contours
- Prepare soil for seeding
- Seed site
- Complete final clean up

2.0 Decommissioning Components and Activities

The wind farm components and decommissioning activities necessary to restore the Project area, as near as practicable, to pre-construction conditions are described within this section. Tatanka Ridge will dismantle and remove all towers, turbine generators, transformers, overhead and underground cables, foundations, buildings, and ancillary equipment to a depth of 42 inches unless landowner agreements specify a greater depth. To the extent possible the permittees shall restore and reclaim the site to its pre-project topography and topsoil quality.

Estimated quantities of materials to be removed and salvaged or disposed are included in this section. Public roads damaged or modified during the decommissioning and reclamation process shall be repaired upon completion of the Project.

2.1 Wind Farm System Overview

The Project will use a combination of GE127 2.82 MW and GE116 2.3 MW turbines with a total nameplate generating capacity of up to 155 MW. Table 1 presents a summary of the primary components included in this decommissioning plan.

Table 1 Primary Components of Wind Farm to be Decommissioned

Component	Quantity	Unit of Measure
Wind turbines (including one tower, one nacelle, one hub and one rotor with three rotor blades per turbine)	56	Each
Step-up transformers	56	Each
Wind turbine foundations	56	Each
Crane pads or mats	56	Each
Access roads	89,760	Lineal Feet (estimated)

2.2 Wind Turbine Generators

The GE127 2.82 MW model wind turbine generators are primarily comprised of a modular steel tower, nacelle, and rotor with three rotor blades attached to a hub. The hub height of the turbines will be 88.5 meters (m) with a 127 m rotor diameter. The GE116 2.3 MW model wind turbine generators have comparable components and share a similar platform, with a hub height of 90 m and with a 116 m rotor diameter. The components of both are modular in design, allowing for ease of construction, replacement, and disassembly during decommissioning. Turbine components in working condition may be refurbished and sold in a secondary market yielding greater revenue than selling as salvage material. For the purposes of this report, estimates will be based on the salvage value, as this will be the most conservative estimate of revenue.

Turbine Tower - The turbine towers are painted modular monopole steel structures approximately 88.5 to 90 m long. Each tower contains approximately 172 tons of salvageable steel. It is estimated that the tower sections will be cut down to transportable size and sent to a scrap metal facility for processing.

Nacelle - The nacelle sits at the top of the turbine tower and has an overall weight of approximately 75 tons including the bedplate. The nacelle is comprised of approximately 80% salvageable steel along with other non-salvageable materials. Non-salvageable material within the nacelle will be disposed in a landfill.

Hub, Rotor, and Rotor Blades - The rotor and hub (without blades) has a total weight of approximately 47 tons. It is mainly comprised of steel that will be salvaged along with the tower and nacelle. The rotor blades are constructed of non-metallic materials such as fiberglass, carbon fibers, and epoxies. These materials will likely have no salvage value and will be recycled for a cost.

Other Turbine Components - In addition to the main components previously described, each WTG contains other items such as ladders and platforms, anchor bolts, and internal electrical wiring that will have additional salvage value.

Decommissioning Activity - The wind turbines will be deactivated from the surrounding electrical system and made safe for disassembly. Improvements to access roads and crane pads will be completed to allow crane access to turbines for removal of components. Liquid wastes, including gear box oil and hydraulic fluids will be removed and properly disposed or recycled according to regulations current at the time of decommissioning. Control cabinets, electronic components, and internal electrical wiring will be removed and salvaged. The hub and rotors will be lowered to the ground as a unit for disassembly. The nacelle and turbine sections will be disassembled and removed in the reverse order of assembly.

2.3 Step-Up Transformers

After deactivation, oil will be drained and recycled or disposed at an approved solid waste management facility. The transformer will then be disassembled and removed. Depending on condition, the transformers may be sold for refurbishment and re-use. If not re-used, the transformer will be salvaged for raw materials.

2.4 Wind Turbine Foundations

Typical spread footing foundations utilized for the Project turbines will be predominantly located underground. Below the pedestal is the foundation base, a typically octagonal-shaped concrete structure. The entire foundation sits on supporting sub-grade typically around 10 feet below the ground surface. At the time of this report, foundation design has not yet been completed.

Concrete demolition will be completed on the upper 42 inches of the pedestal. This will include the anchor bolts, rebar, conduits, cables, and concrete to the required depth. The site will be back-filled

with clean fill and graded and the land contours restored as near as practicable to preconstruction conditions. Topsoil will be placed on the disturbed area and revegetated. The cost estimate for the excavation and removal of turbine foundations is conservatively based on the previous foundation design sizes. Material would be demolished and hauled to a landfill.

2.5 Collection System

The Project's electrical collection system will be overhead or located in cable trenches that will generally be buried at a depth more than 42 inches below the ground surface. The system voltage is 34.5 kilovolts (kV) and will run from the individual turbine step-up transformers to the Project substation.

The Project collection system would not interfere with farming activities when placed 42 inches or more below ground surface. Hence, complete cable removal is not required at decommissioning to restore the wind farm site to its former use. Cables 42 inches or more below ground surface will be completely deactivated and abandoned in place. Minimal decommissioning costs are associated with the collection system and are included in the turbine decommissioning estimate. If, at the time of decommissioning, the salvage value of the underground cable exceeds the cost of extraction and restoration, the cables may be removed and salvaged.

2.6 Crane Pads

Crane pads will be located at the base of each turbine to support the large cranes necessary for assembly and disassembly of the turbines. Pads will be approximately 60 feet by 80 feet and consist of compacted native soils and approximately one half foot of base fill. After decommissioning activities are completed, the crane pad aggregate will be removed and the areas filled with native soil, as necessary. Land will be graded and pre-construction contours restored to the extent practicable. Restoration will likely be performed in conjunction with the turbine foundation and/or access road restoration. Soils compacted during de-construction activities will be de-compacted (ripped to 18 inches), as necessary, to restore the land to preconstruction land use. Labor for trucking and equipment is the primary expense for the crane pad removal.

2.7 Access Roads

The Project includes construction of roads to provide access from public roads to the turbine sites. The final width of the roads is approximately 16 feet, widening near the turbine base. The total length of Project access roads is approximately 17 miles. During the initial construction of the wind farm, the existing soils will be graded to match the typical contour of the adjacent land and compacted. The estimated quantity of these materials is provided in Table 2.

Table 2 Typical Access Road Construction Materials

Item	Number	Unit
Geotextile	180,000	Square Yards
Aggregate Course	53,200	Cubic Yards

Tatanka Ridge will remove all access roads unless an affected landowner requests otherwise. Tatanka Ridge will record any agreement for removal to a lesser depth or for no removal with the County and show the locations of all such foundations. Tatanka Ridge will submit all such agreements with affected landowners to the County prior to completion of restoration activities. Tatanka Ridge will restore the Project within 18 months after expiration of the issued permit, or upon earlier termination of operation of the Project. The estimate assumes 75% of the roads are to be removed and returned to preconstruction state. Decommissioning activities include the removal and stockpiling of aggregate materials onsite for salvage preparation. Local townships or farmers may accept the material prior to processing for use on local roads or field access roads; however, for the purpose of this estimate it is conservatively assumed that all materials will be removed from the Project area.

Following removal of aggregate, the access road areas will be graded, de-compacted (ripped to 18 inches), back-filled with native soils, as needed, and land contours restored as near as practicable to preconstruction conditions.

While there would likely be some salvage value for the aggregate surface material, this estimate assumes any costs of material to be removed from the site to be offset by those gained by secondary sales. Therefore, no salvage value for aggregate has been estimated.

2.8 Project Substation

All equipment, conductors, transformers, steel, wiring, and fencing is to be removed. Footings, underground cabling, and aggregate will be removed from the substation site to a depth of 42 inches. Electrical equipment may have value on the secondary market for refurbishment or scrap. Steel and foundations are to be removed and brought to the landfill. Cost of demolishing the substation was based on crews and a scheduled timeframe. No salvage cost was given to the substation.

2.9 Topsoil Restoration and Revegetation

Project sites that have been excavated and back-filled will be graded as previously described to restore land contours as near as practicable to preconstruction conditions. Topsoil will be placed on disturbed areas and seeded with appropriate vegetation to reintegrate it with the surrounding environment. Soils compacted during de-construction activities will be de-compacted, as necessary, to restore the land to preconstruction land use.

3.0 Decommissioning Cost Estimate Summary

Expenses and revenues associated with decommissioning the Project will be dependent on labor costs and market value of salvageable materials at the time of decommissioning. For the purposes of this report, approximate mid-2018 to early-2019 average market values were used to estimate labor expenses. Fluctuation and inflation of the salvage values or labor costs were not factored into the estimates.

3.1 Decommissioning Expenses and Revenues

Project decommissioning will incur costs associated with the disassembly, removal, excavation, and restoration of the proposed wind turbine sites and support infrastructure as described in Section 2. Table 3 summarizes the estimates for activities associated with the major components of the Project.

Revenue from decommissioning the Project will be realized through the sale of wind farm components and construction materials. Turbine components may be sold within a secondary market or as salvage. For purposes of this report, estimated recovery values were based on the salvage value, as this is the more conservative estimate of revenue.

The market value of both steel and copper fluctuate daily, although in the long term, both have generally trended upward. Steel prices are generally more stable than copper. Salvage value estimates were based on a current average price of steel and copper derived from sources including material processing companies and American Metals Market index. The price used to value the steel used in this report is $170 per ton. This factors in a 10-year steel average, scrap yard handling, and processing to mill size (two feet by five feet), and milling. The value of copper, $2.10 per pound ($4,200 per ton) and the value of aluminum at $.47 per pound ($940 per ton) were used in this report. The nacelle was assumed to have approximately 80% salvageable steel content; the hub, gearbox and tower 90%. Table 3 summarizes the potential salvage value for the wind turbine components, transformer, and construction materials.

Table 3 Estimated Decommissioning Expenses and Revenues

Activity	Decommission or Salvage	Unit	Number	Cost or Salvage Price per Unit	Total
Overhead and management (includes estimated permitting required; 8%)	Decommission	Lump Sum	1	$531,000	$ 531,000
Mobilization and demobilization (6%)	Decommission	Lump Sum	1	$398,000	$ 398,000
Access Road Prep	Decommission	Lump Sum	1	$42,000	$ 42,000
Crane Mob and Operations	Decommission	Each	56	$31,071	$ 1,740,000
Tower Disassembly	Decommission	Each	56	$30,250	$ 1,694,000
Blade Demo & Recycling	Decommission	Each	56	$14,000	$ 784,000
Turbine Foundation Removal	Decommission	Each	56	$15,839	$ 887,000
Collector Line Removal	Decommission	Lump Sum	1	$38,000	$ 38,000
Site Restoration (Roads, Turbine & Aux Sites)	Decommission	Lump Sum	1	$1,314,000	$ 1,314,000
O & M Removal	Decommission	Lump Sum	1	$55,000	$ 55,000
Substation Demo	Decommission	Lump Sum	1	$71,000	$ 71,000
MET Tower Demo	Decommission	Lump Sum	1	$15,000	$ 15,000
Contingency	Decommission	Percent	20%	$1,514,000	$ 1,514,000
Turbine tower (steel) (total per 56 turbines)	Salvage	Tons per turbine	155	($170)	($1,475,600)
Nacelle (steel) (total per 56 turbines)	Salvage	Tons per nacelle	67	($170)	($637,840)
Rotor hub (total per 56 turbines)	Salvage	Tons per hub	31	($170)	($295,120)
Generator/gearbox (total per 56 turbines)	Salvage	Tons per Gen	19	($170)	($180,880)
Transformer (total per 56 turbines)	Salvage	Per turbine	1	($3,600)	($201,600)
Copper (total per 56 turbines)	Salvage	Tons per turbine	5.3	($4,200)	($1,246,560)
Aluminum (total per 56 turbines)	Salvage	Tons per turbine	2	($940)	($105,280)
Oil disposal	Salvage	Per turbine	1	$1,000	$56,000
Collector line (aluminum)	Salvage	Lump Sum	1	($7,100)	($7,100)

3.2 Net Decommissioning Cost Summary

The following is a summary of the net estimated cost to decommission the Project, using the information detailed in Sections 3.2 and 3.3. Estimates are based on 2018 prices, with no market fluctuations or inflation considered.

Table 4 Net Decommissioning Summary

Item	Cost
Decommissioning expenses	$9,083,000
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**

This engineer's estimate produces a conservative estimate of the cost of decommissioning the Project based on the following considerations:

1. Limited design work has been completed.
2. Quantities based on design work completed.
3. This concept-level (Class IV, per AACEI cost estimate classification system 17R-97) cost estimate is based on engineering of 1-15% design and is meant for feasibility uses. Costs will change with further design changes. Class IV estimates are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +30%. The accuracy range is based on professional judgment considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped.

3.3 Financial Assurance

Tatanka Ridge will commit to a parent guarantee for financial assurance adequate to pay the entire cost of the decommissioning process. Decommissioning costs will be re-evaluated after the first year of facility operation, then every ten years following. The initial inflation rate will be 2.5% and will be considered when decommissioning costs are re-evaluated.

3.4 Salvage Value

Salvage values are considered to be the most variable component of the decommissioning study. Depending on the material, equipment, and salvage opportunities, the means and methods used by the contractor would vary from scrapping materials completely to selling equipment in the secondary market and processing materials and equipment, onsite or at a facility, for future use or scrap value.

Assumptions in the salvage values were based on current conditions and processing applications. Many materials that are non-recyclable will likely be sent to a landfill, such as concrete debris, wood, or turbine blades.

3.4.1 Pricing assumptions

Material salvage pricing is derived from the American Metals Market Index. Prices below are quoted from scrap yards based on current market prices. The steel price is a 10-year market average. In order to capitalize on these prices, material would need to be shipped to a mill and be cut to size prior to shipment. In this case, most components were assumed to be disassembled in a process similar to erection and cut to shippable size onsite. Ability to reclaim all scrap at this pricing is not likely. Some factor is taken in the pricing to account for an assumed grade of scrap.

The following pricing assumptions were used to calculate scrap and waste value. Weights are in gross tons:

- Steel $170/ton
- Copper $4,200/ton
- Aluminum $940/ton

Salvage weight has been estimated, scaled, or has been taken from manufacturer's technical data sheets. Some resale value of components is likely. In this case, certain transformers and electrical components would be considered to have immediate value on the market because of their longer design life. It is likely that newer components may be installed during the lifetime of the wind farm due to maintenance or failure of older components. This estimate does not make attempts to quantify resale of equipment to a secondary market, rather it makes the assumption that all salvage costs will come from scrapping of raw materials.

3.5 Markups

The following typical contractor markups were applied to the Demolition Cost Estimate only:

- Contractor Project Management/Overhead 8%
- Mobilization/Bond/Insurance 6%

3.6 Escalation Rate

Barr Engineering Co. (Barr) has not changed, scaled, or accounted for escalation of costs in the future. Considering the volatility of several markets, construction, energy, and labor, an update to this cost estimate prior to actual decommissioning is recommended. This study quantifies the Project in today's current market and estimates cost in 2019 dollars.

3.7 Estimate Classification

This concept-level (Class IV, per AACEI cost estimate classification system 17R-97) cost estimate is based on engineering of 1-15% design and is meant for feasibility uses. Costs will change with further design changes. Class IV estimates are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +30%. The accuracy range is based on professional judgment considering the level of design completed, the complexity of the Project, and the uncertainties in the Project as scoped.

3.8 Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate:

- 2019 R.S. Means
- American Metals Market Index
- Barr historical data
- Vendor quotes on scrap and shipping associated costs
- Estimator judgment

3.9 Estimate Methodology

Costs were built up from crews and equipment over an estimated schedule as well as contacting industry professionals for quotes and pricing. Some items, such as the MET tower costs, were lump sum allowances based on similar decommissioning studies.

3.10 Labor Costs

The estimate is based upon national labor rates.

3.11 Sales Tax

This demolition contract estimate has been assumed to not incur any sales tax.

3.12 Soft Costs

The cost estimate does not include any soft costs. Soft costs that would likely be associated with the Project would be engineering, design, permitting, land, legal, and other fees.

3.13 Major Assumptions

The estimate is based on the assumption the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a

reasonable project schedule, no overtime, work performed as under a single contract, and no liquidated damages.

This estimate was prepared in February 2019. As with all estimates, it represents a snapshot in time of what is known about the Project and expected to occur. The commodities and energy markets are active at this point in time. Changes in either could have dramatic effects on this estimate. Therefore, this estimate should be viewed in that light and if more than 180 days have passed or there have been significant changes in the commodity markets, this estimate should be updated and reevaluated.

- Commodity prices for steel, copper, and aluminum were sourced from the AMM cost index and adjusted based on discussions with scrap vendors. (Different types and grades of metals will vary pricing.)
- The site is readily accessible.
- Only minor repairs to access roads will be necessary to accommodate crane access.
- Turbine blades will be disposed or recycled. Materials will be brought to an approved disposal site within 60 miles.
- Only turbine foundation pedestal sections and a portion of the footing is to be removed to 42 inches below grade.
- 90% of tower steel was estimated to be recoverable.
- 40% of the generator weight is salvageable copper.
- Aluminum ladders, internals, and platforms are estimated to be 2 ton per turbine.
- Contractor will be allowed to stage construction to obtain the most efficient workflow possible.
- Contractor will not be required to perform work using the same means or methods used to produce this estimate.
- Contractor will be allowed to use the most appropriate, safest, and efficient methods available to them at the time of performing the work.
- Contractor will secure and provide any required demolition permits or certificates.
- Demolition contractor will load salvage materials in appropriate sizes and weights at each site to recycling buyer's vehicle.
- Assumed 89,760 linear feet (17 miles) of access road, 16 feet in nominal width.
- Turbine and tower dismantling production is 2 work days per turbine.
- Crane movement and setup is separate from dismantling operation.

- Site restoration includes roadway removal and regrading of site, including deep tilling to remove compaction of soils at the road and tower site. 75% of the road will be removed, 25% will remain.
- Salvaged roadway material is stockpiled or delivered within a 20-mile radius of each turbine site. Assumed resale value offsets freight fees.
- Half day of decommissioning preparation per site, including oil removal, is allocated prior to crane dismantling.
- All recycled material is processed to manageable sizes for transport from site.
- All recycled material is provided to recycling vendor Free On Board Shipping Point.
- Sales tax is not included; the Project is assumed not to be purchasing major quantities of new materials.

3.14 Excluded Costs

The cost estimate excludes the following costs:

- Non-construction or soft costs for design, services during construction, land, legal, and owner administration costs.

4.0 Referenced Documents

This estimate is based upon the following documents:

- GIS data 3-27-2019 (Avangrid)
- GE 2.0MW Platform – Weights and Dimensions
- AMM August 2018 Pricing Index

Figures

Clear Lake
Hamlin Township
Havana Township
Clear Lake Township
Herrick Township
Lake Cochrane
Dempster Township
Hidewood Township
Brandt Township
Brandt
Norden Township
Hamlin County
Deuel County
Minnesota
Estelline Township
Grange Township
Blom Township
Scandinavia Township
Estelline
Toronto
Astoria
Deuel County
Brookings County
Preston Township
Eureka Township
Argo Township
Oak Lake Township
Lake Hendricks Township

Topography Source: USGS 24k DRG

Project Boundary
Municipality
Civil Township Boundary
County Boundary
State Boundary

ND
MT
MN
WY
IA
NE

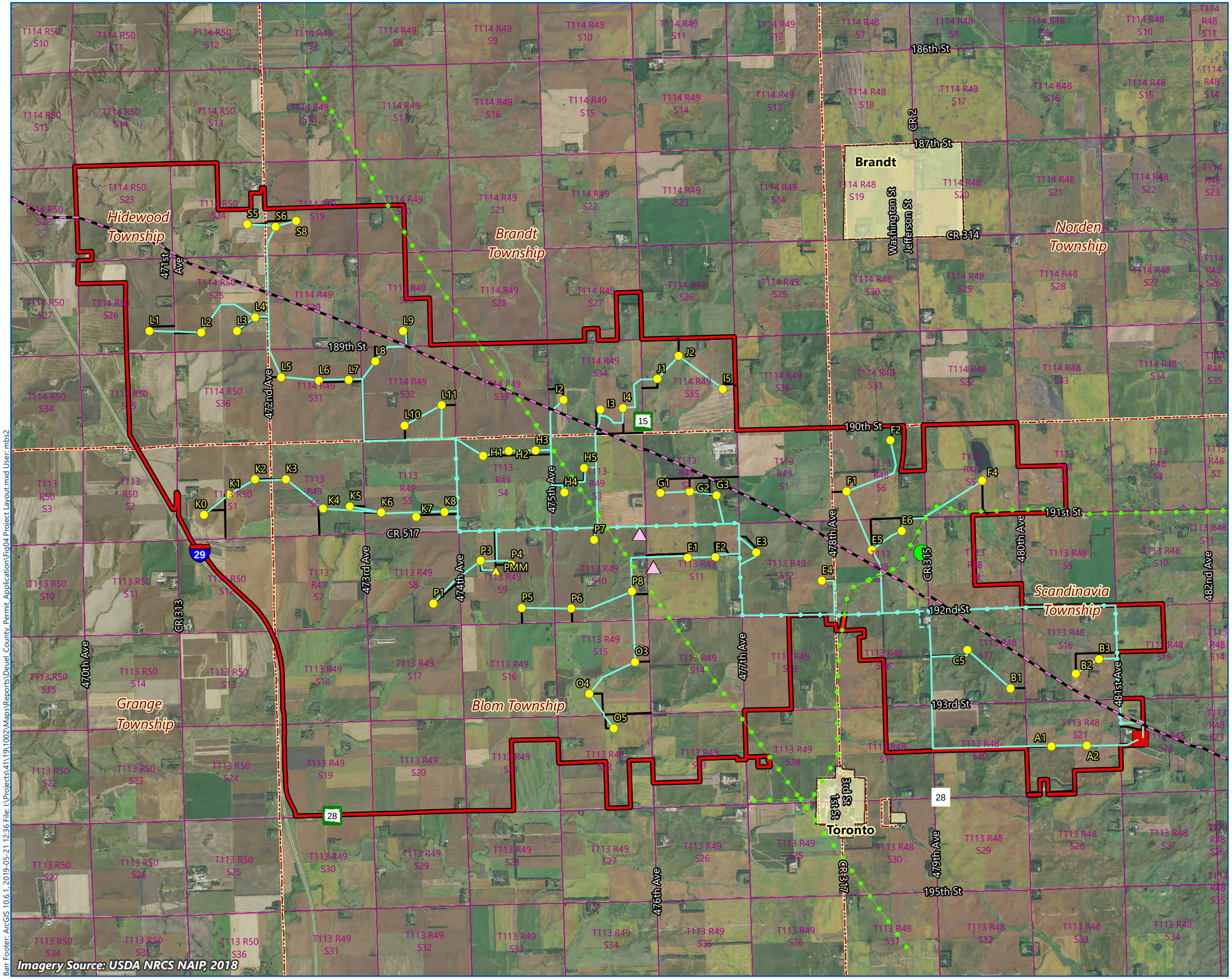
Miles
2 0 2

Kilometers
3 0 3

Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\41\19.1002\Maps\Reports\Deuel_County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2



Turbine Location
Met Tower Location
Laydown Area
O&M Building
Substation
Access Road

Collector Line

Underground
Overhead/Underground
Final Alignment To Be Determined
Existing Underground Pipeline
Existing Overhead Transmission Line
Project Boundary
Municipality
Public Land Survey Section
Civil Township Boundary
County Boundary

Miles
1 0 1

Kilometers
1.5 0 1.5

Figure 2

PROJECT LAYOUT
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-05-21 12:36 File: I:\Projects\41\19\1002\Maps\Reports\Deuel_County_Permit_Application\Fig04 Project Layout.mxd User: mbs2

Appendix R

Agency Correspondence

Jesse Bermel
Business Developer

May 6, 2019

Deuel County Board of Commissioners
PO Box 616
408 4th Street West
Clear Lake, South Dakota 57226

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Commissioners,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities include access roads, collection lines, communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation.

As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. As you know, the Project also requires Wind Energy System and Special Exception permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be complete in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

Tatanka Ridge has conducted annual meetings with the Deuel County Board of Commissioners and Board of Adjustment to introduce you to the project and inform you of changes. Additionally, we've conducted outreach to the residents of Deuel County and participating landowners. Tatanka Ridge used the information gained through this outreach

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

to optimize and refine Project design, identify and resolve issues, and address concerns brought forward by stakeholders prior to submitting applications to Deuel County.

On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving any additional comments you may have, in writing, by June 6, 2019.

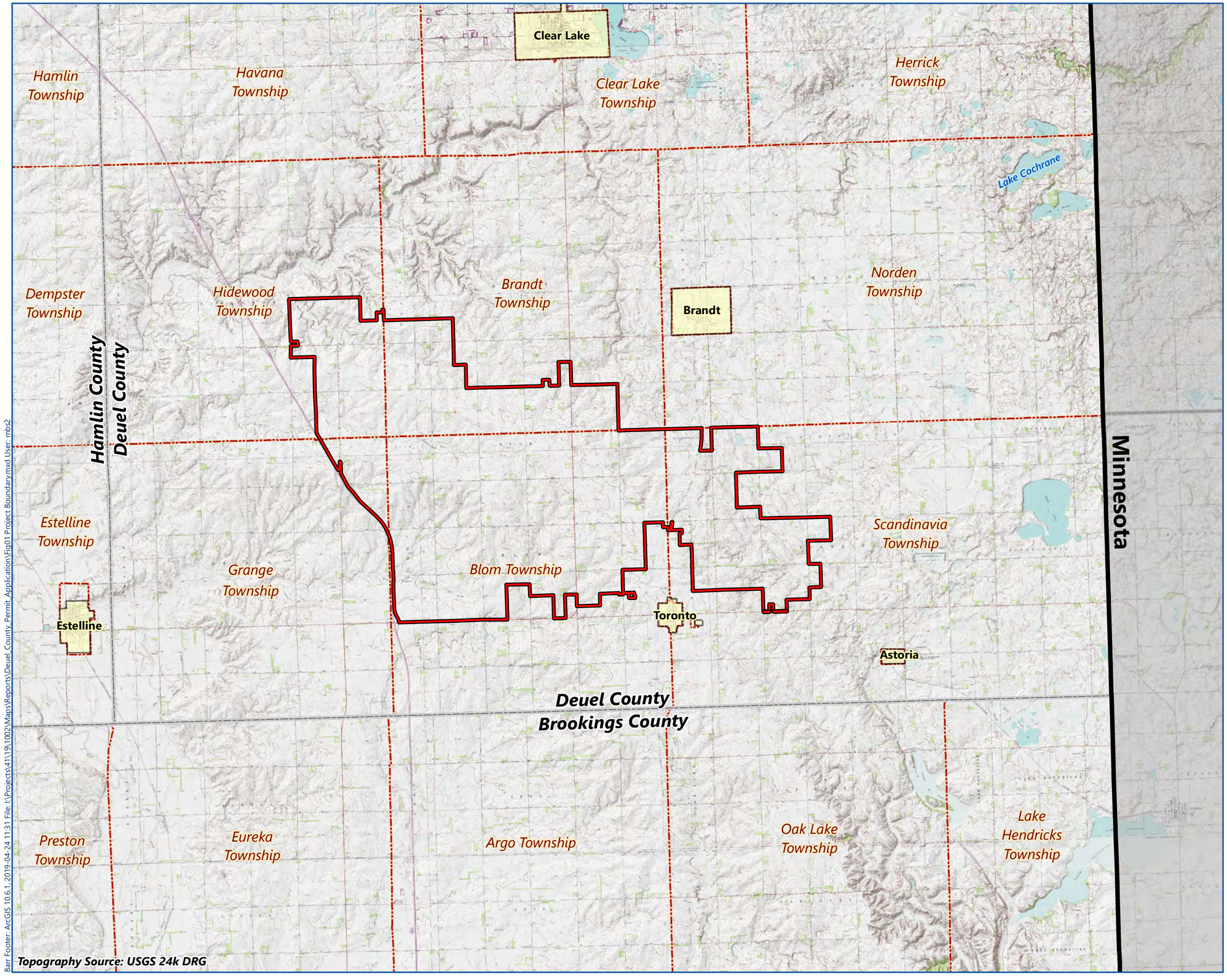
Please feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512.

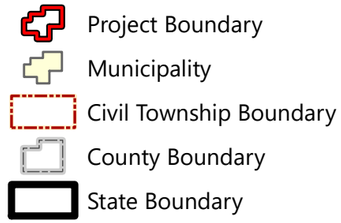
Yours Sincerely,

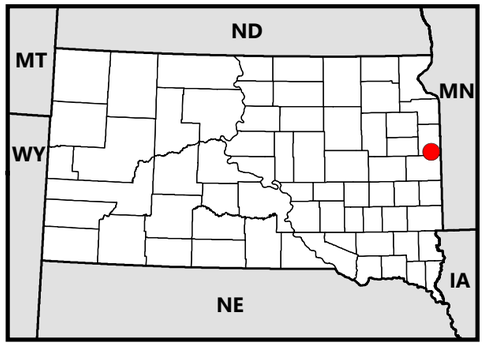
Jesse Bermel
Business Developer

Attachments: Project Location Map

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP







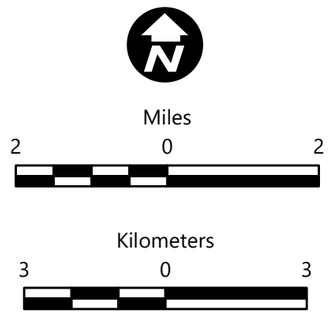


Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\41\19.1002\Maps\Reports\Deuel_County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2

Jesse Bermel
Business Developer

May 6, 2019

Paige Olson
Review and Compliance Coordinator
South Dakota State Historical Society
900 Governors Drive
Pierre, South Dakota 57501

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Ms. Olson,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities will include access roads, collection lines, communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation. As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. The Project also requires Wind Energy System and Special Exception Permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be completed in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

On September 5, 2018, Avangrid and HDR held a conference call with your office to provide an overview of the Project. During that call we discussed that no state or federal regulatory nexus applied to the Project and, as such, a sample (or due diligence) archaeological survey

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

would be completed for the cultural resource effort. We provided comment that the sample archaeological survey was developed by coding the landscape that held Project facilities with high, medium, and low-potential designations. We also stated that the areas of high potential would be archaeologically surveyed and that the archaeological survey methods employed for the effort would follow the guidance provided by the SHPO for completing archaeological surveys in the state. Based on the information provided during the call, SHPO was comfortable with Avangrid's archaeological resource consideration approach.

On April 3, 2019, Avangrid and HDR held another conference call with you and Kate Nelson to provide a project update. As discussed in the call, the Project, based on its updated megawatt capacity, now falls under PUC permitting review. In accordance with this change we discussed the anticipated permitting needs as they relate to archaeological resource consideration, and what, in your opinion, would make for the smoothest approval process. During the conversation, we determined that our updated plan to consider archaeological resources in all areas of proposed disturbance was adequate, our plan to consider known architectural resources within one mile of the Project boundary was adequate, and that our proposed reporting schedule would meet the needs of SHPO, PUC, and the October hearing date. Hence, it is our understanding at this time that SHPO is comfortable with our approach to the archaeological survey, the schedule for completing the field work, and our plan for reporting.

The purpose of this letter is to inform your organization of the proposed Project and to seek your comments regarding any potential concerns or issues that may exist within the Project area. On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving your comments, in writing, by June 6, 2019.

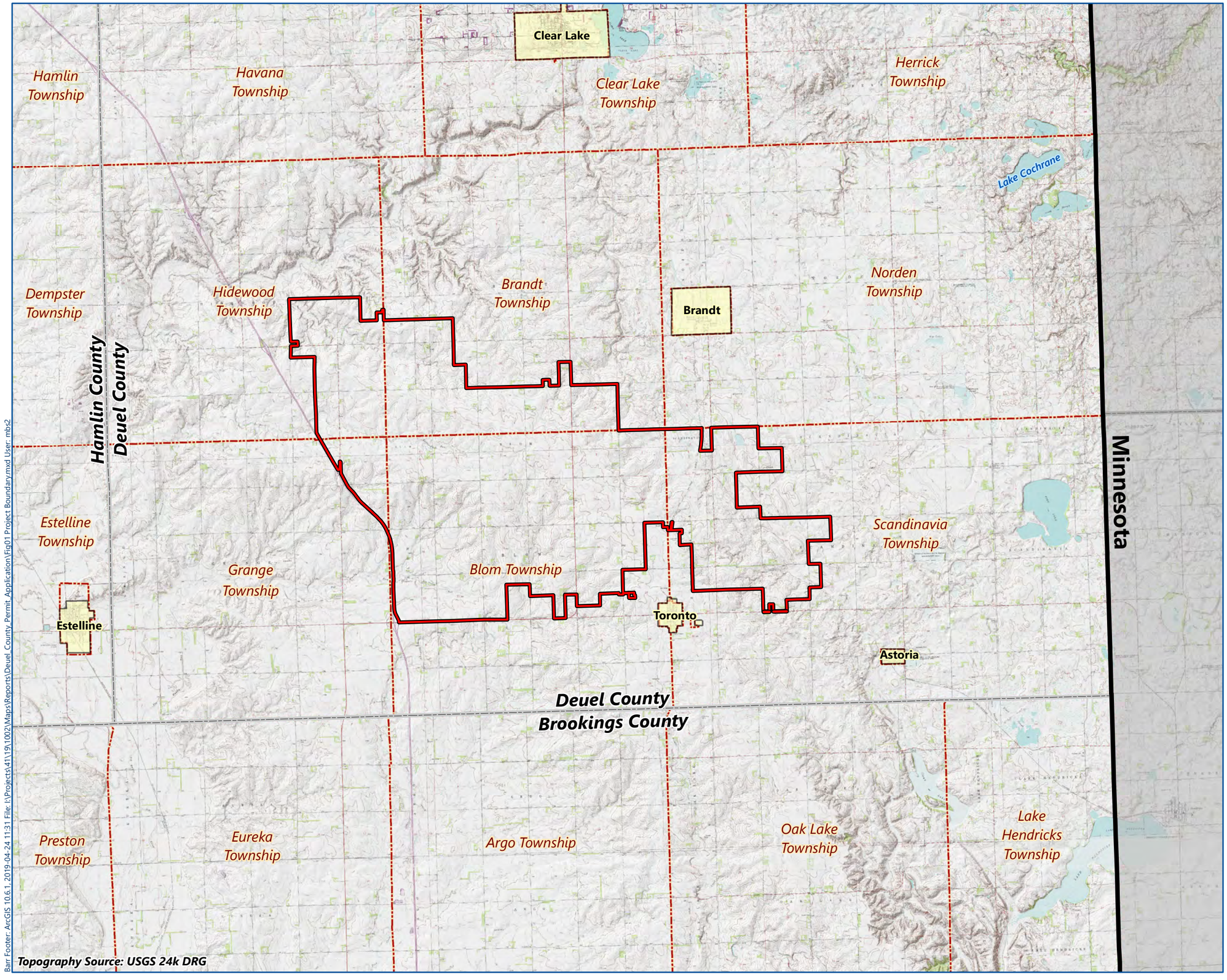
Please feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512. We look forward to working with you on this Project and continuing an open dialogue.

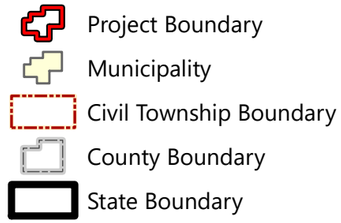
Yours Sincerely,

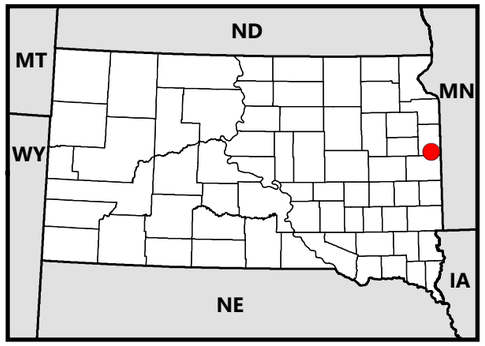
Jesse Bermel
Business Developer

Attachments: Project Location Map

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP







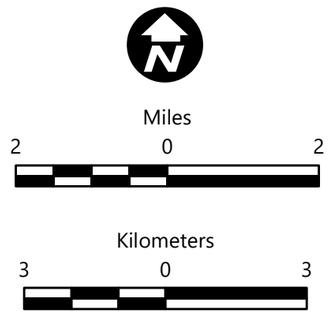


Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\41\19.1002\Maps\Reports\Deuel_County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2

Jesse Bermel
Business Developer

May 6, 2019

Steven M. Pirner, P.E.
Department Secretary
South Dakota Department of Environment & Natural Resources
Joe Foss Building
523 East Capitol Avenue
Pierre, South Dakota 57501

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Mr. Pirner,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities will include access roads, collection lines, communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation. As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. The Project also requires Wind Energy System and Special Exception Permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be completed in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

The purpose of this letter is to inform your organization of the proposed Project and to seek your comments regarding any potential concerns or issues that may exist within the Project

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

area, as well as additional permits and approvals that may be necessary. On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving your comments, in writing, by June 6, 2019.

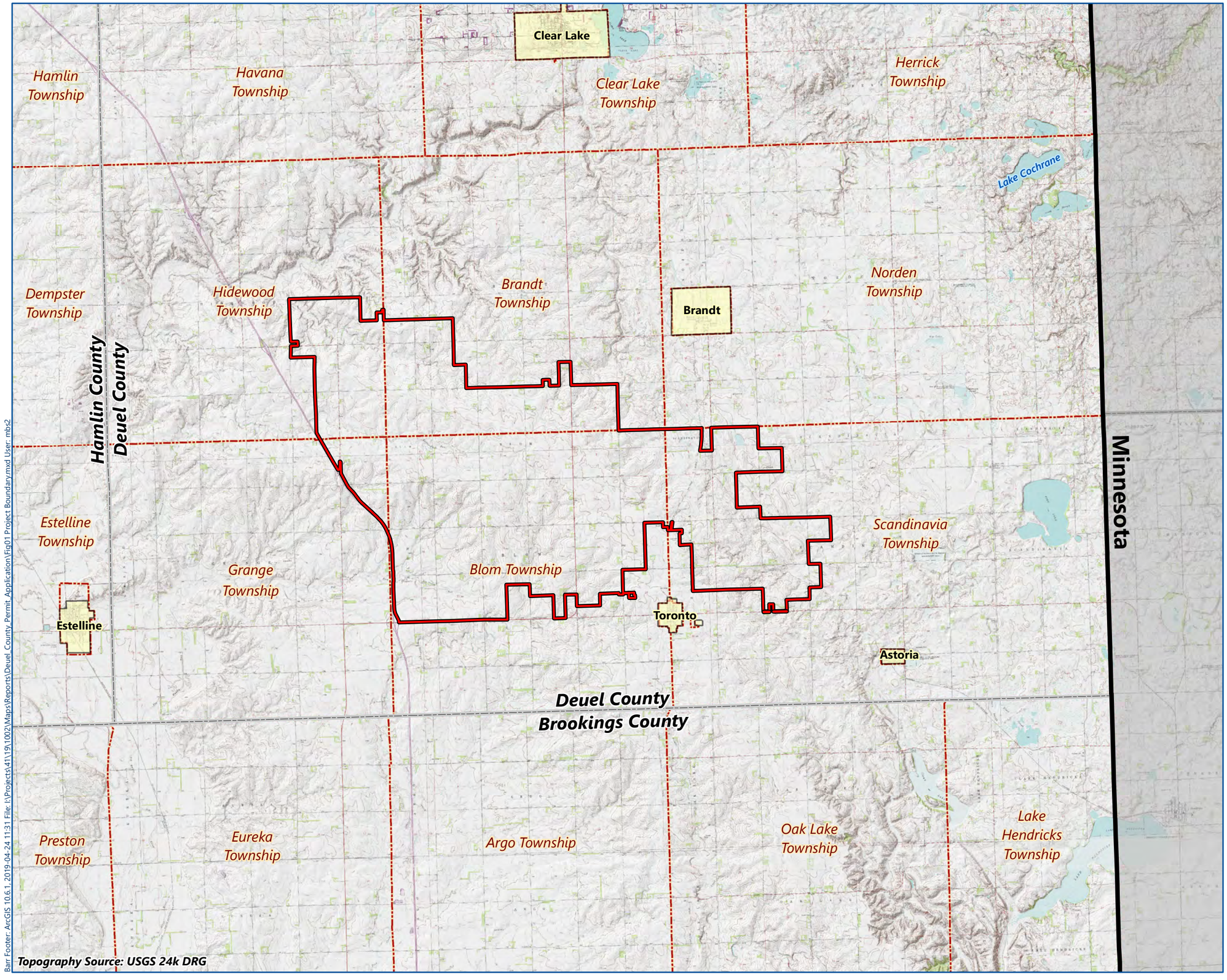
Please feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512.

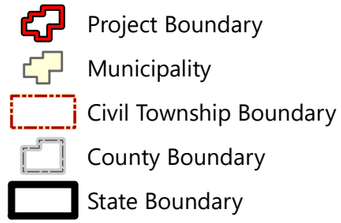
Yours Sincerely,

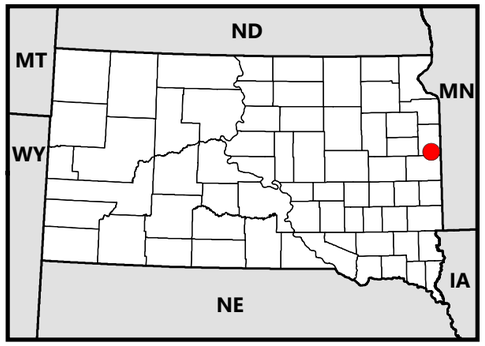
Jesse Bermel
Business Developer

Attachments: Project Location Map

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP







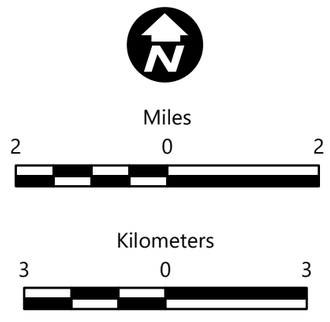


Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\41\19.1002\Maps\Reports\Deuel_County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

June 3, 2019

Jesse Bermel
Avangrid Renewables, LLC
1125 NW Couch Street
Portland, OR 97209

RE: Environmental Assessment – Request for Comments
Tatanka Ridge Wind Project, Deuel County, South Dakota

.

Dear Jesse:

The South Dakota Department of Environment and Natural Resources (DENR) Surface Water Quality Program has reviewed the proposed Tatanka Ridge Wind Project in Deuel County, South Dakota. Based on the information provided, DENR has the following comments:

1. 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. Contact the Department of Environment and Natural Resources for additional information or guidance at 1-800-SDSTORM (1-800-737-8676) or http://denr.sd.gov/des/sw/stormwater.aspx.

2. A Surface Water Discharge permit may be required if any construction dewatering should occur as a result of this project. Please contact this office for more information.

3. 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.

   This project may be 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 have to be taken to ensure that the 30-day average total suspended solids criterion of 150 mg/L is not violated.

4. 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. Please contact the United States Army Corps of Engineers for more information 605-224-8531.

If you have any questions concerning these comments, please contact me by email at Shannon.Minerich@state.sd.us. Thank you.

Sincerely,

Shannon Minerich
Environmental Scientist
Surface Water Quality Program

RECEIVED
MAY 07 2019
Dept. of Environment and
Natural Resources
Waste Management

RECEIVED
MAY 7 - 2019
Dept. of Environment and
Natural Resources
Secretary's Office

AVANGRID
RENEWABLES

Jesse Bermel
Business Developer

Waste Management Determination
Hazardous Waste/Solid Waste/Asbestos
It appears, based on the information provided, that this project will have little or no impact on the waste management in this area.
Approved By: James L. Winker
Date: May 10, 2019
South Dakota Department of Environment & Natural Resources
Phone: (605) 773-3153 Fax: (605) 773-6035

May 6, 2019

Steven M. Pirner, P.E.
Department Secretary
South Dakota Department of Environment & Natural Resources
Joe Foss Building
523 East Capitol Avenue
Pierre, South Dakota 57501

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Mr. Pirner,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities will include access roads, collection lines, communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation. As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. The Project also requires Wind Energy System and Special Exception Permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be completed in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

The purpose of this letter is to inform your organization of the proposed Project and to seek your comments regarding any potential concerns or issues that may exist within the Project

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

area, as well as additional permits and approvals that may be necessary. On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving your comments, in writing, by June 6, 2019.

Please feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512.

Yours Sincerely,

Jesse Bermel
Business Developer

Attachments: Project Location Map

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP

RECEIVED
MAY 07 2019
AIR QUALITY
PROGRAM

RECEIVED
MAY 7 - 2019
Dept. of Environment and
Natural Resources
Secretary's Office

AVANGRID
RENEWABLES

Jesse Bermel
Business Developer

AIR QUALITY DETERMINATION
It appears, based on the information, that the project will have little or no impact on the air quality in this area. This project is approved.
Approved By: _____
Date: 5-13-19
(605) 773-3151
South Dakota Department of Environment
And Natural Resources

May 6, 2019

Steven M. Pirner, P.E.
Department Secretary
South Dakota Department of Environment & Natural Resources
Joe Foss Building
523 East Capitol Avenue
Pierre, South Dakota 57501

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Mr. Pirner,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities will include access roads, collection lines, communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation. As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. The Project also requires Wind Energy System and Special Exception Permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be completed in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

The purpose of this letter is to inform your organization of the proposed Project and to seek your comments regarding any potential concerns or issues that may exist within the Project

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

area, as well as additional permits and approvals that may be necessary. On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving your comments, in writing, by June 6, 2019.

Please feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512.

Yours Sincerely,

Jesse Bermel
Business Developer

Attachments: Project Location Map

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP

Jesse Bermel
Business Developer

May 6, 2019

Hilary Meyer
Environmental Review Coordinator
South Dakota Game, Fish, & Parks Department
523 East Capitol Avenue
Pierre, South Dakota 57501

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Ms. Meyer,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities will include access roads, collection lines, communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation. As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. The Project also requires Wind Energy System and Special Exception Permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be completed in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

On April 4, 2019, we held a conference call with you to provide an overview of the Project, including a discussion of state-listed species documented in Deuel County. The State of South Dakota maintains a list of endangered and threatened species, for which take is a

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

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).

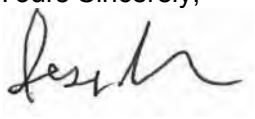
To obtain information on state-listed species potentially present within or near the Project, Tatanka Ridge reviewed the State of South Dakota's list of threatened, endangered, and candidate species documented within Deuel County, which was last updated in 2016 (SDGFP 2016), and requested a SDNHP database review of rare plants, animals, and ecosystems documented in or near the Project. The SDNHP's response to this request, dated May 30, 2018, is attached.

Three state-listed endangered or threatened species have been documented within Deuel County, including the northern river otter, banded killifish, and northern redbelly dace; however, none of these species has been documented within or near the Project. Because the northern river otter occurs within large, slow-moving waterbodies where large fish are present (Kiesnow and Dieter 2005), which are not present within the Project boundary, the potential for the Project to impact this species is considered minimal. The banded killifish and northern redbelly dace both occur within a variety of aquatic habitats, including streams, ponds, and lakes (Ohio Division of Wildlife 2018, Pasbrig 2014); however, the potential for this habitat to occur within the Project boundary is very low.

The purpose of this letter is to document that the Project will not impact state-listed species, to conclude consultation under SDLC 34A-8-9, and to seek your comments regarding any potential concerns or issues that may exist within the Project area as well as additional permits and approvals that may be necessary. On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving your comments, in writing, by June 6, 2019.

Please feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512.

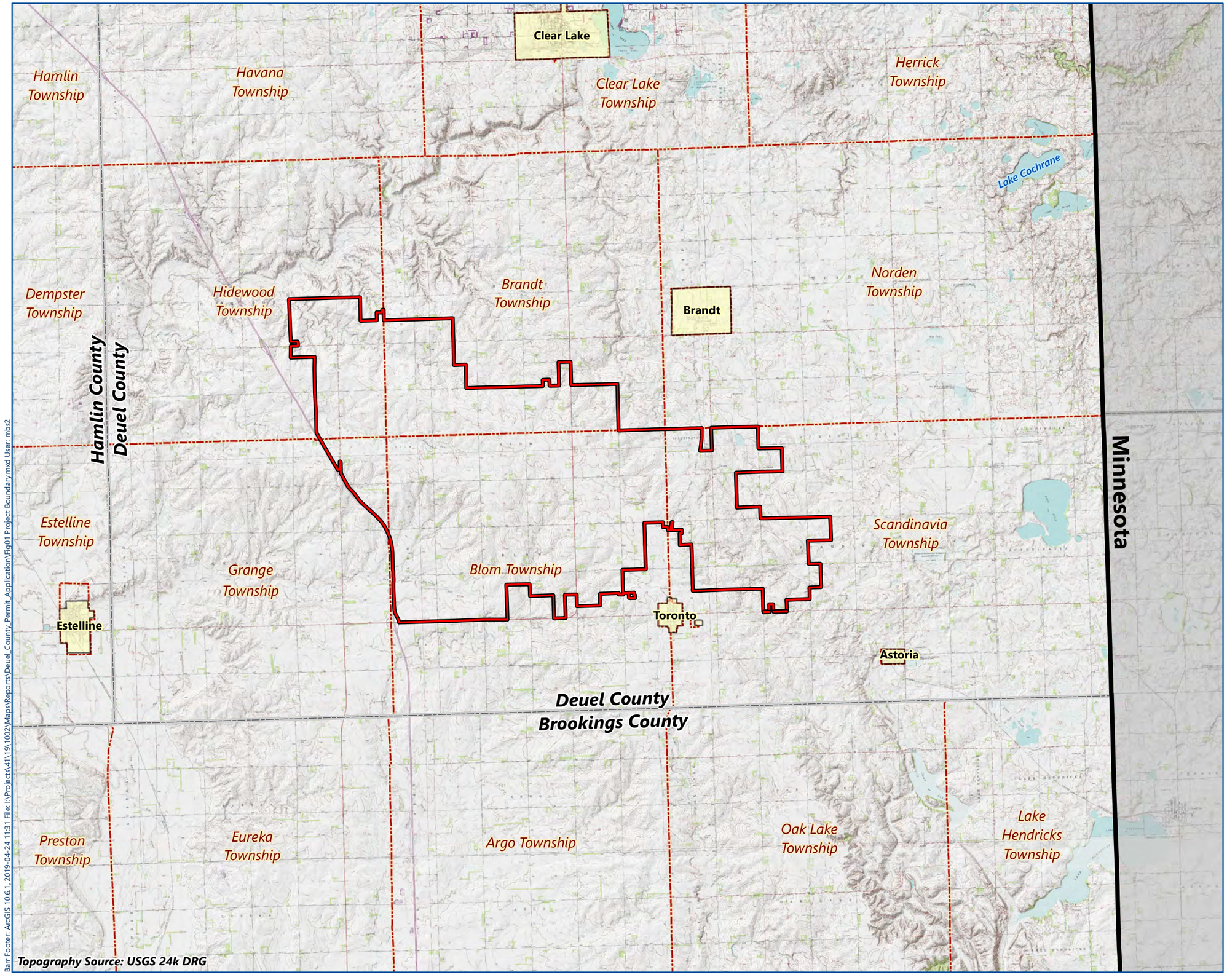
Yours Sincerely,

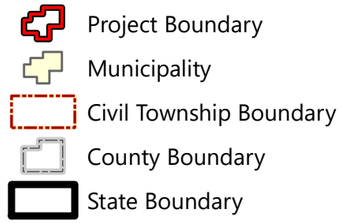


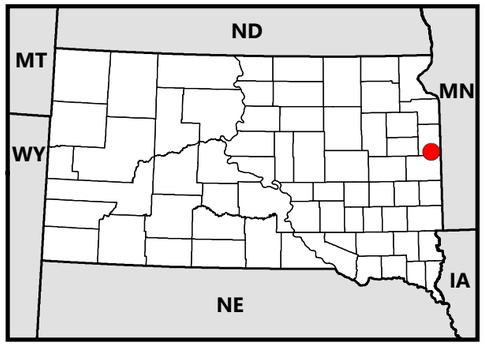
Jesse Bermel
Business Developer

Attachments: Project Location Map
SDNHP May 30, 2018 Response

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP







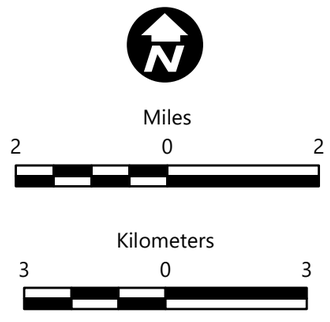


Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\41\19.1002\Maps\Reports\Deuel_County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2

Janelle Rieland <jrieland@west-inc.com>

RE: Natural Heritage Program Data Request

1 message

Heimerl, Casey <Casey.Heimerl@state.sd.us> Wed, May 30, 2018 at 11:27 AM
To: Janelle Rieland <jrieland@west-inc.com>

Hi Janelle,

Attached is a shapefile of records from the Natural Heritage Database that occurred within the project area you provided. Please note that many places in South Dakota have not been surveyed for rare or protected species and the absence of any additional records from the database does not preclude their presence in your project area.

Also attached is an invoice for the request and a description of the attribute fields in the shapefile.

If you have any questions please feel free to contact me.

~Casey

From: Janelle Rieland [mailto:jrieland@west-inc.com]
Sent: Wednesday, May 30, 2018 11:03 AM
To: Heimerl, Casey
Subject: Re: [EXT] Natural Heritage Program Data Request

Hi Casey,

Attached, please find the signed data use agreement. Thanks for your help!

On Wed, May 30, 2018 at 10:38 AM Heimerl, Casey <Casey.Heimerl@state.sd.us> wrote:

> Hi Janelle,
>
> There will be a couple records returned from this search. Could you please sign and email me back the a ached data use agreement?
>
> Thanks,
>
> ~Casey
>
> **From:** Janelle Rieland [mailto:jrieland@west-inc.com]
> **Sent:** Tuesday, May 29, 2018 9:41 AM
> **To:** Heimerl, Casey
> **Subject:** Re: [EXT] Natural Heritage Program Data Request
>
> Good morning Casey,
>
> Thank you for getting back to me! Attached, please find the shapefile of the project area of interest.
>
> Have a wonderful morning,
>
> On Tue, May 29, 2018 at 9:34 AM Heimerl, Casey <Casey.Heimerl@state.sd.us> wrote:
>
> > Hi Janelle,
> >
> > I received your request for SD Natural Heritage data. Please provide me with a map or a shapefile (preferably) for your requested search area. I also want to make sure you are aware of the fees associated with data requests. Fees include $30 per hour of staff me required and $30 per database search. Once I receive your project area I can provide you with a cost es mate before I proceed if necessary. If the search results in any records, I will also require you to sign a data use agreement.
> >
> > Thanks!
> >
> > ~Casey
> >
> > **Casey Heimerl** |*Wildlife Biologist*
> >
> > South Dakota Game, Fish and Parks
> >
> > 523 East Capitol Avenue | Pierre, SD 57501
> >
> > 605.773.4345 | Casey.Heimerl@state.sd.us
> >
> > **From:** info@gfp.sd.us [mailto:info@gfp.sd.us]
> > **Sent:** Thursday, May 24, 2018 4:41 PM
> > **To:** jrieland@west-inc.com

Cc: Heimerl, Casey
Subject: Natural Heritage Program Data Request

South Dakota - Game, Fish, and Parks

Natural Heritage Program Data Request

A new form was just submitted from the http://gfp.sd.gov/ website with the following information:

ID:	8
Agency/Org/Business:	Western EcoSystems Technology, Inc. (WEST)
Name:	Janelle Rieland
Address:	7575 Golden Valley Road, Suite 350 Golden Valley, MN 55427
Email:	jrieland@west-inc.com
Phone:	612-310-8012
Fax:	
URL:	
Element or Subject:	Looking to obtain records of known federally and state-listed species and other environmentally sensitive resources located in or near a proposed project site.
Type of Data:	Shape files (ideally), location, and species information.
Purpose of Request:	Preliminary site evaluation

--

Janelle Rieland

Project Manager

Western Ecosystems Technology, Inc.
Environmental & Statistical Consultants

7575 Golden Valley Road, Suite 350

Golden Valley, MN 55427

Office - 763-270-0953

Cell - 612-310-8012

jrieland@west-inc.com

www.west-inc.com

Follow WEST: Facebook, Twitter, Linked In, Join our Mailing list

CONFIDENTIALITY NOTICE: This message and any accompanying communications are covered by the Electronic Communications Privacy Act, 18 U.S.C. §§ 2510-2521, and contain information that is privileged, confidential or otherwise protected from disclosure. If you are not the intended recipient or an agent responsible for delivering the communication to the intended recipient, you are hereby notified that you have received this communication in error. Dissemination, distribution or copying of this e-mail or the information herein by anyone other than the intended recipient, or an employee or agent responsible for delivering the message to the intended recipient, is prohibited. If you have received this communication in error, please notify us immediately by e-mail and delete the original message. Thank you.

Please consider the environment before printing.

--

Janelle Rieland

Project Manager

Western Ecosystems Technology, Inc.
Environmental & Statistical Consultants

7575 Golden Valley Road, Suite 350

Golden Valley, MN 55427

Office - 763-270-0953

Cell - 612-310-8012

jrieland@west-inc.com

www.west-inc.com

Follow WEST: Facebook, Twitter, Linked In, Join our Mailing list

CONFIDENTIALITY NOTICE: This message and any accompanying communications are covered by the Electronic Communications Privacy Act, 18 U.S.C. §§ 2510-2521, and contain information that is privileged, confidential or otherwise protected from disclosure. If you are not the intended recipient or an agent responsible for delivering the communication to the intended recipient, you are hereby notified that you have received this communication in error. Dissemination, distribution or copying of this e-mail or the information herein by anyone other than the intended recipient, or an employee or agent responsible for delivering the message to the intended recipient, is prohibited. If you have received this communication in error, please notify us immediately by e-mail and delete the original message. Thank you.

Please consider the environment before printing.

3 attachments

SDNHP-5-30-18.zip
3K

Invoice SDNHP-05-30-18-01.pdf
45K

EOdatafields.pdf
77K

Jesse Bermel
Business Developer

May 6, 2019

Scott Larson
Field Supervisor
Ecological Services
U.S. Fish & Wildlife Service
420 S. Garfield Avenue, Suite 400
Pierre, South Dakota 57501

RE: Proposed Tatanka Ridge Wind Project
Deuel County, South Dakota

Dear Mr. Larson,

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will have a nameplate capacity of up to 155 megawatts and will include construction of up to 56 turbines. Additional Project facilities will include access roads, collection and communication systems and cabling, an operation and maintenance building, a permanent meteorological tower, and an electrical substation. As a result, Tatanka Ridge is currently preparing to submit an application to the South Dakota Public Utilities Commission (PUC) for an Energy Facility Site Permit in accordance with Administrative Rules of South Dakota 20:10:22 and South Dakota Codified Law Ch. 49-41B. The Project also requires Wind Energy System and Special Exception Permits from Deuel County. Subject to receipt of all necessary authorizations, construction of the Project will commence and be completed in 2020.

The Project is located entirely within Deuel County in the following sections and townships (refer to the attached figure):

Sections	Township
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)

On September 5, 2018, we met with staff from your office to provide an overview of the Project, discuss the status of complete and pending field surveys, as well as potential for

Avangrid Renewables, LLC
1125 NW Couch Street, Portland, Oregon 97209
Telephone 319.626.2512
www.avangridrenewables.us, jbermel@avangrid.com

An equal opportunity employer

impacts to listed species and U.S. Fish & Wildlife Service easements. As additional surveys are conducted, we will continue to consult with U.S. Fish and Wildlife Service.

The purpose of this letter is to inform your organization of the proposed Project and to seek your comments regarding any potential concerns or issues that may exist within the Project area. On April 29, 2019, we submitted a Wind Energy System and Special Exception Permit application to Deuel County. In addition, Tatanka Ridge will include copies of all correspondence received regarding the proposed Project with the Energy Facility Site Permit application for the PUC's records. Therefore, we would greatly appreciate receiving your comments, in writing, by June 6, 2019.

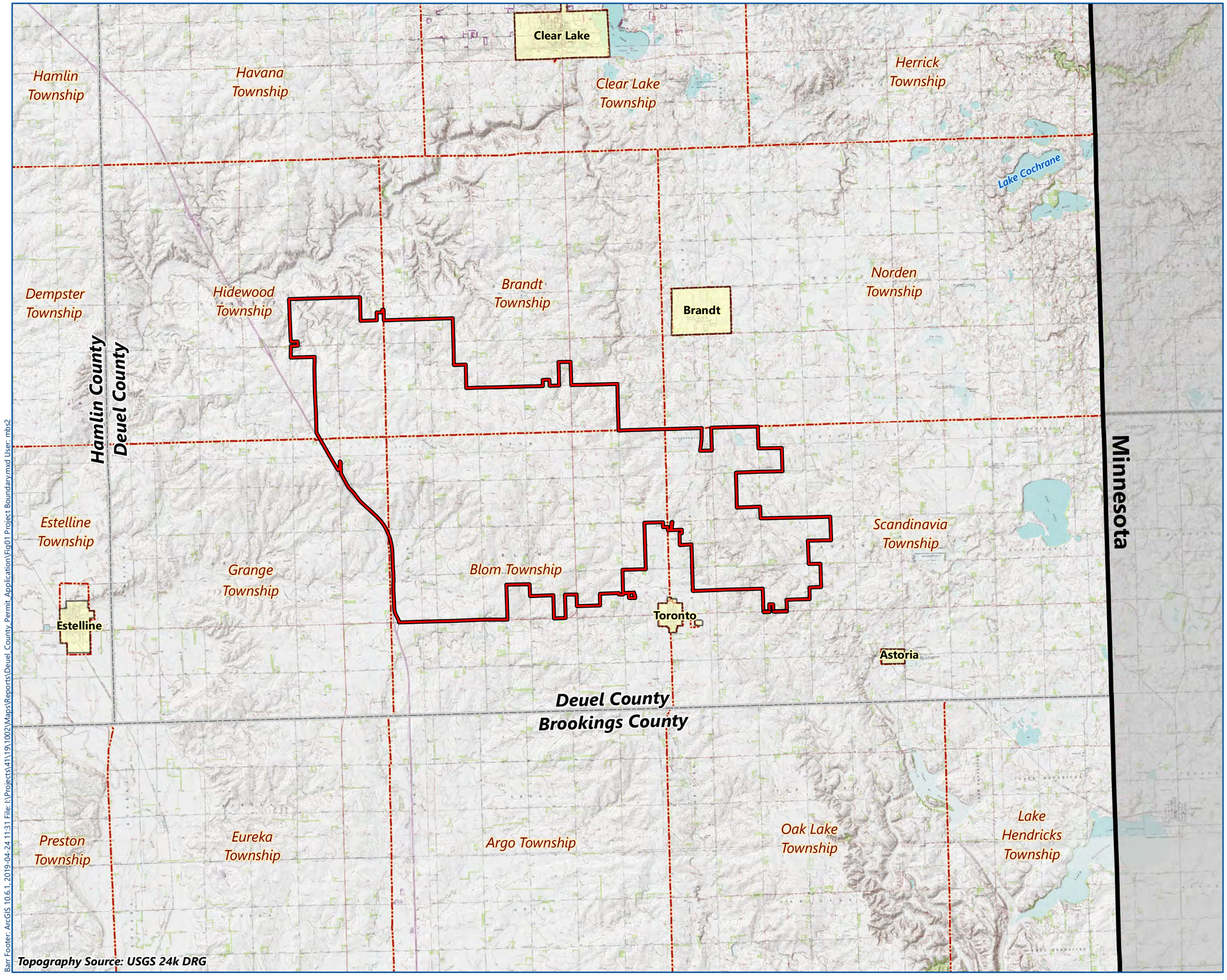
Pease feel free to direct any questions or comments to me at jbermel@avangrid.com, or (319) 626-2512.

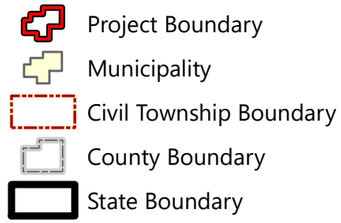
Yours Sincerely,

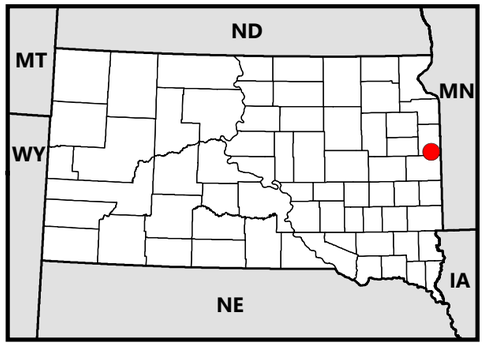
Jesse Bermel
Business Developer

Attachments: Project Location Map

cc: Rachael Shetka, Barr Engineering Co.
Mandy Bohnenblust, Avangrid Renewables
Brett Koenecke, May, Adam, Gerdes &Thompson, LLP







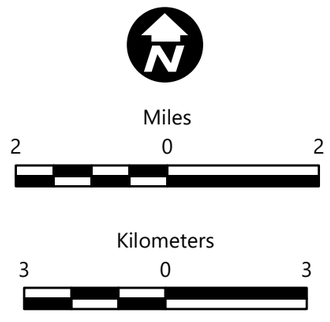


Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\41\19.1002\Maps\Reports\Deuel_County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Dakota Ecological Services
420 South Garfield Avenue, Suite 400
Pierre, South Dakota 57501-5408
(605) 224-8693, southdakotafieldoffice@fws.gov

IN REPLY REFER TO:
Tatanka Ridge Wind, Deuel County

May 30, 2019

Mr. Jesse Bermel
Avangrid Renewables, LLC
1125 NW Couch Street
Portland, Oregon 97209

Dear Mr. Bermel:

This letter is in response to your request dated May 6, 2019, for environmental comments regarding the proposed Tatanka Ridge Wind Project (formerly known as Buffalo Ridge III) involving installation of up to 56 turbines (155 MW) and associated project facilities in Deuel County, South Dakota.

Via a September 5, 2018, meeting and email exchanges with Avangrid and consultants, we are in receipt of 2018 and 2019 project reports on habitats and/or surveys regarding northern long-eared bats, eagle/raptor nests, and the Dakota skipper/Poweshiek skipperling; it is our understanding that additional reports will be available at a later date. Per our meeting, we are aware of, but do not have, older reports from work done on the site (former Buffalo Ridge III efforts).

We have recommended avoidance of grassland and wetland habitats, and advised of the potential for indirect impacts to grassland nesting birds and waterfowl in these habitats, as well as the need to offset any such impacts. As of this writing, your consultant WEST indicated in a May 29, 2019, email that only one of the possible 62 turbines will be sited in grassland. It appears efforts were made to avoid direct impacts to grasslands and wetlands, although we have no information on placement of associated roads or other project facilities. Additionally, turbines placed in cropland can have indirect effects to wildlife occurring on adjacent grasslands and wetlands. It is not apparent that this effect has been acknowledged or quantified, and we are not aware of any plans to offset this impact. As stated during our September 5, 2018, meeting, the Tatanka Ridge project is proposed within an area dominated by (65%) croplands; during an April 4, 2019, call, the cropland acreage was stated to be 71%. Our recommendation to avoid grassland and wetlands as much as possible by micrositing, and quantify/offset any remaining direct and indirect impacts, still applies.

We have conveyed potential concerns regarding the Topeka shiner and stream crossings that may be required as a result of this project. If project-related actions occur in, or adjacent to stream

habitat of this endangered minnow, the species may be impacted and additional coordination with this office may be required to ensure compliance with the Endangered Species Act, potentially via the U.S. Army Corps of Engineers if a permit from that agency is required.

The attached document provides additional details, information, and recommendations regarding important wildlife habitats and U.S. Fish and Wildlife Service (Service) trust resources including federally listed species, eagles, birds of conservation concern, and other migratory birds that may occur in the project area and vicinity. We have included guidelines and methods to apply to various components of a wind farm including turbines, meteorological towers, and power lines in order to avoid, minimize and/or compensate for impacts to trust resources and assist you in achieving compliance with Federal laws.

If changes are made in the project plans or operating criteria, or if additional information becomes available, the Service should be informed so that the above determinations can be reconsidered.

The Service appreciates the opportunity to provide comments. If you have any questions on these comments, please contact Natalie Gates of this office at (605) 224-8693, Extension 227.

Sincerely,

Natalie Gates

For Scott Larson
Field Supervisor
North and South Dakota Field Offices

Attachment

cc: USFWS/Madison WMD/Natoma Hansen
SDDGFP/Pierre/Hilary Meyer
SDPUC/Pierre/Darren Kearney

Attachment: USFWS Information and Recommendations Regarding the Tatanka Ridge Wind Project, Deuel County, South Dakota
May 30, 2019

2012 Land-Based Wind Energy Guidelines

Per our coordination regarding this project, we recognize that Avangrid is aware of and has been using the voluntary 2012 *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines* (WEG) (available online at: http://www.fws.gov/windenergy/) which were developed in consultation with wind industry companies. We recommend close adherence to these guidelines, using the information gathered to determine first whether the project should be placed in the area of interest at all. The WEG invokes a tiered approach in which information is collected with increasing levels of detail in order to evaluate risk posed to habitats and wildlife at potential wind energy sites. Tiers 1-3 each represent a preconstruction decision point to either move forward to development, gather more information and move to the next tier, or to abandon project plans at a given site, thereby avoiding areas where development is precluded or where wildlife impacts are likely to be high and difficult or costly to remedy or mitigate at a later stage. If the project is to proceed at the chosen location, then the information gathered per the WEG should guide project specifics, such as turbine locations, and any needed mitigation measures. Wind energy facility effects to wildlife are both direct and indirect, typically including collision mortality, loss of habitat due to the footprint of the turbines/roads/other facilities, habitat fragmentation, displacement, encroachment of invasive weeds, and more. Currently, the best strategy to reduce impacts to wildlife in is to develop wind energy facilities within areas dominated by cropland wherever possible to preclude direct impacts to valuable wildlife habitats, and siting turbines away from adjacent wildlife habitat as much as possible to reduce indirect effects. Note that the South Dakota Department of Game, Fish and Parks also developed siting guidelines for wind developers, *Siting Guidelines for Wind Power Projects in South Dakota*, available online at: https://gfp.sd.gov/userdocs/docs/wind-energy-guidelines.pdf.

U.S. Fish and Wildlife Service Land Interests

The location of the proposed Tatanka Ridge Wind Project falls within an area under the jurisdiction of the Service's Madison Wetland Management District (WMD). We are aware that you have been in contact with Madison WMD staff to determine the exact locations of these properties and any additional restrictions that may apply regarding those sites. It is our understanding the proposed project facilities will not directly impact USFWS land interests, but we recommend continued coordination with Madison WMD staff to ensure avoidance is achieved.

Eagle Guidance

Golden eagles (*Aquila chrysaetos*) are year-round residents in western South Dakota, and may be found throughout the state in winter or during migration. Bald eagles (*Haliaeetus leucocephalus*) occur throughout South Dakota in all seasons. These species are protected from

a variety of harmful actions via take prohibitions in both the Migratory Bird Treaty Act[1] (MBTA; 16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. 668–668d). The BGEPA, enacted in 1940 and amended several times, prohibits take of bald eagles and golden eagles, including their parts, nests, young or eggs, except where otherwise permitted pursuant to federal regulations. Incidental take of eagles from actions such as electrocutions from power lines or wind turbine strikes are prohibited unless specifically authorized via an eagle incidental take permit from US Fish and Wildlife Service (Service). BGEPA provides penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." BGEPA defines take to include the following actions: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Service expanded this definition by regulation to include the term "destroy" to ensure that "take" also encompasses destruction of eagle nests. Also the Service defined the term disturb which means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

The Service has developed guidance for the public regarding means to avoid take of bald and golden eagles:

- The 2007 *National Bald Eagle Management Guidelines* serve to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of BGEPA may apply. They provide conservation recommendations to help people avoid and/or minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the BGEPA. https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf
- The 2013 *Eagle Conservation Plan Guidance, Module 1- Land-based Wind Energy, Version 2* is specific to wind energy development and provides in-depth guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities. Development of an Eagle Conservation Plan per these guidelines may serve as the basis for applying for an eagle incidental take permit for wind energy facilities. Applications for such eagle incidental take permits must include an Eagle

[1] On December 22, 2017, the Department of the Interior's (DOI) Office of the Solicitor Memorandum M-37050 titled The Migratory Bird Treaty Act Does Not Prohibit Incidental Take (https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf) concludes that the MBTA'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. The MBTA list of protected species includes bald and golden eagles, and the law has been an effective tool to pursue incidental take cases involving eagles. However, the primary law protecting eagles is the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S. Code § 668), since the bald eagle was delisted under the Endangered Species Act in 2007. Memorandum-37050 does not affect the ability of the Service to refer entities for prosecution that have violated the take prohibitions for eagles established by the BGEPA.

Conservation Plan.
https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

The Service also has promulgated new permit regulations under BGEPA:

- New eagle permit regulations, as allowed under BGEPA, were promulgated by the Service in 2009 (74 FR 46836; Sept. 11, 2009) and revised in 2016 (81 FR 91494; Dec. 16, 2016). The regulations authorize the limited take of bald and golden eagles where the take to be authorized is associated with otherwise lawful activities. These regulations also establish permit provisions for intentional take of eagle nests where necessary to ensure public health and safety, in addition to other limited circumstances. The revisions in 2016 included changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees in order to clarify, improve implementation and increase compliance while still protecting eagles.
https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/2016-29908.pdf

The Service's Office of Law Enforcement carries out its mission to protect eagles through investigations and enforcement, as well as by fostering relationships with individuals, companies, industries and agencies that have taken effective steps to avoid take, including incidental take of these species, and encouraging others to implement measures to avoid take. The Office of Law Enforcement focuses its resources on investigating individuals and entities that take eagles without identifying and implementing all reasonable, prudent and effective measures to avoid that take. Those individuals and entities are encouraged to work closely with Service biologists to identify available protective measures, and to implement those measures during all activities or situations where their action or inaction may result in the take of an eagle(s).

Note that the Service has also developed recommendations for wind developers specific to the Mountain-Prairie Region (Region 6):

- *Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities* –The goal of these recommendations is to contribute to maintaining stable or increasing breeding populations of eagles by recommending conservation measures that will maintain breeding territories and minimize impacts to other important eagle use areas (e.g., eagle nests, foraging areas, and communal roosts). https://www.fws.gov/coloradoes/documents/Final_GOEA_Buffer_Recommendations_AvoidanceMinimization_WindFacilities_April_10_2013.pdf.
- *Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from USFWS Region 6* – In the event a project proponent intends to develop an ECP, this Region 6 document provides recommendations, in an outline format, for developing and organizing the content of an ECP, and includes additional details on topics that should be addressed in the plan. https://www.fws.gov/coloradoes/documents/Final_USFWS_R6_ECP_guidance.pdf.

We recommend close adherence to the guidelines above, including modeling of eagle data to determine the level of risk posed by the project and possible need for an eagle take permit. We request results of any eagle data collected at the Tatanka Ridge Wind Project.

Threatened/Endangered Species

In accordance with section 7(c) of the Endangered Species Act (ESA), as amended, 16 U.S.C. 1531 et seq., we have determined that the following federally listed species may occur in the project area (this list is considered valid for 90 days):

Species	Status	Expected Occurrence
Topeka Shiner (*Notropis topeka*)	Endangered	Resident or potential resident
Rufa Red Knot (*Calidris canutus rufa*)	Threatened	Rare seasonal migrant
Northern Long-eared Bat (*Myotis septentrionalis*)	Threatened	Summer resident, seasonal migrant, known winter resident in the Black Hills
Dakota Skipper (*Hesperia dacotae*)	Threatened	Resident in native prairie, northeastern SD
Poweshiek Skipperling (*Oarisma poweshiek*)	Endangered	Resident in native prairie, northeastern SD

Topeka shiner

The Topeka shiner is a small minnow known to occupy numerous small streams within eastern South Dakota's Big Sioux, Vermillion, and James River watersheds. Within the vicinity of the Tatanka Ridge Wind Project, Hidewood Creek, Peg Munky Run, and North Deer Creek are known occupied Topeka shiner streams. Tributaries of these waterways should be assumed occupied, unless circumstances indicate otherwise (e.g. a tributary is completely dry with no pools). Note that the species' habitat includes intermittent streams and the species may persist in isolated pools among surrounding dry streambed within such habitats. If activities of the proposed project may impact these streams directly (instream work) or indirectly (activities adjacent to the stream), we advise additional coordination with this office to ensure compliance with the ESA.

Rufa Red Knot:

The rufa red knot is a robin-sized shorebird listed as threatened under the Endangered Species Act. The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Although it is primarily a coastal species, small numbers of rufa red knots are reported annually across the

interior United States (i.e., greater than 25 miles from the Gulf or Atlantic Coasts) during spring and fall migration. These reported sightings are concentrated along the Great Lakes, but multiple reports have been made from nearly every interior State, including South Dakota. The species does not breed in this state.

Northern Long-eared Bat:
The northern long-eared bat is a medium-sized brown bat listed as threatened under the Endangered Species Act. The species is present in South Dakota year-round, primarily roosting singly or in colonies underneath bark, in cavities or in crevices of both live and dead trees in the summer. Some hibernacula exist within caves/mines in the Black Hills. The species has also been detected in both forested and non-forested (e.g. Badlands National Park) areas in South Dakota during the summer months, and along the Missouri River during migration. White nose syndrome - a fungus affecting hibernating bats - is considered a significant threat to this species, but individuals may be harmed by other activities such as modifications to hibernacula, timber harvest, human disturbance, and collisions with wind turbines. Currently, feathering turbine blades and increasing cut-in speeds are recommended measures to reduce the risk of bat mortality at wind generation facilities. A 4(d) rule has been published that exempts take of Northern long-eared bats in certain circumstances. See: https://www.fws.gov/Midwest/Endangered/mammals/nleb/index.html.

The recommended survey protocols for the northern long-eared bat are identical for those established for the Indiana Bat (*Myotis sodalis*) and are available online at: https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html. Per your consultant's (WEST) northern long-eared bat habitat/survey reports, those guidelines were applied to this project. Note, however, that due to the nature of suitable habitats identified at this site (small/isolated/scattered) the application of one aspect of the guidelines may have been applied in a manner that resulted in an inadequate level of effort to determine, with confidence, the presence/probable absence of the species. The guidelines indicate that for every 123 acres of suitable habitat, one location should be surveyed. At the Tatanka Ridge Wind Project, 12 small, isolated and scattered forested patches (10 acres or more in size) were identified as suitable habitat. The acreages of these 12 sites were combined, totaling 195 acres, and resulting in the need for two survey locations. One patch was surveyed in 2018 when the project area was smaller and less suitable habitat was identified, and in 2019 one more site will be surveyed to achieve the two locations needed to meet the one-per-123-acre criteria in the guidelines. These two patches compose only 17% of the twelve patches in the project area, with only one site of twelve (8%) checked each year (actual percentage of the 195 acres covered by the surveys is unknown). These numbers appear to represent relatively low level of coverage of the identified suitable habitat sites, and may not be adequate to detect an uncommon species that tends to avoid flying in large open areas (e.g. between fragmented forest patches). As you know, surveys are voluntary and currently the 4(d) rule exempts take of the northern long-eared bat via wind turbine collision. However, if the purpose of conducting surveys is to determine with confidence that the species is, or is not, present at the Tatanka Ridge Wind Project site, then the method of combining acreages of these small/isolated/scattered forested habitat patches into a single total may not be an appropriate means to determine the level of survey effort needed. Surveys of additional patches may be needed to increase confidence in survey conclusions.

Dakota Skipper

The Dakota skipper is a small prairie butterfly listed federally as a threatened species. Dakota skippers are obligate residents of high quality prairie ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie. In northeastern South Dakota, Dakota skippers inhabit dry-mesic hill prairies with abundant purple coneflower *(Echinacea angustifolia)*, but also use mesic to wet-mesic tallgrass prairie habitats characterized by wood lily (*Lilium philadelphicum*) and mountain deathacamas (smooth camas; *Zigadenus elegans*). Their dispersal ability is very limited due in part to their short adult life span and single annual flight. Extirpation from a site may be permanent unless it occurs within about 0.6 miles of an inhabited site that generates a sufficient number of emigrants. Avoidance of impacts to native prairie habitat is recommended to reduce the risk of adverse effects to this species. Critical habitat has been designated for this species in South Dakota; for details and locations see the following website: http://www.fws.gov/Midwest/endangered/insects/dask/index.html.

Flight-season surveys for adult Dakota skipper and Poweshiek skipperling (below) were conducted at the Tatanka Ridge site in 2018 with no detections of the two species. Per SWCA Environmental Consultants' report *Dakota skipper (Hesperia dacotae) and Poweshiek skipperling (Oarisma poweshiek) Survey Report for the Tatanka Ridge Wind Project, Deuel County, South Dakota*, suitable habitat exists at the project site, although much of it is deemed marginal due to factors such as lack of nectar species, small patch size, isolation, lack of plant diversity and predominance of invasive grass species. SWCA utilized the *2018 Dakota Skipper (Hesperia dacotae) North Dakota Survey Protocol* (available online at: https://www.fws.gov/mountainrairie/ es/protocols/2018_FINAL%20Dakota %20Skipper% 20Survey%20Protocol_4202018.pdf) adding a 250 m buffer to surveyed sites, appropriate when there is no known Dakota skipper locations nearby. It appears the protocol was followed perhaps with exception of single-year sampling occurring at "peak" times (approximately 5 days after flight period begins); the last few survey dates in July may have missed the peak of the 2018 flight period. Additionally, the exact sites that were surveyed are not clearly identified within SWCA's 2018 report. It is our understanding that additional surveys are planned for this summer. The Service (our Twin Cities Ecological Services Office in Minnesota) tracks both positive and negative Dakota skipper survey locations, thus we request that detailed survey site information be included in all reports.

Poweshiek Skipperling

The Poweshiek skipperling is a small prairie butterfly listed federally as endangered. Their habitat includes prairie fens, grassy lake and stream margins, moist meadows, and wet-mesic to dry tallgrass prairie. Preferred nectar plants for adult Poweshieks include smooth ox-eye (*Heliopsis helianthoides*) and purple coneflower *(Echinacea angustifolia)*, but they also use stiff tickseed (*Coreopsis palmate*), black-eyed susan (*Rudbeckia hirta*), and palespike lobelia (*Lobelia spicata*). Larval food plants are assumed to include spike-rush, sedges, prairie dropseed (*Sporobolus heterolepis*) and little bluestem (*Schizachyrium scoparium*). Poweshiek skipperlings have one flight per year from about the middle of June through the end of July (depending upon weather). They have a low dispersal capability, and may not cross areas that are not structurally similar to native prairies. Extirpation from fragmented and isolated prairie remnants may be permanent unless it occurs within about 0.6 miles of an inhabited site that generates a sufficient number of emigrants. They are vulnerable to extreme weather conditions,

dormant season fire, and other disturbances (e.g., intense cattle grazing). Avoidance of impacts to native prairie habitat is recommended to reduce the risk of adverse effects to this species. Critical habitat has been designated for this species in South Dakota; for details and locations see the following website: http://www.fws.gov/midwest/endangered/insects/dask/finalch.html. Per the above SWCA habitat/survey report for this project, the same *2018 Dakota Skipper (Hesperia dacotae) North Dakota Survey Protocol* recommended above for the Dakota skipper were used to survey for Poweshiek skipperlings without detecting the species at the Tatanka Ridge site.

At this time, it is not clear whether a federal nexus exists for this project. If take of federally listed species may occur and no federal nexus exists, ESA compliance may be achieved by private entities via coordination with this office and development of a Habitat Conservation Plan (HCP). Our website provides more information on HCPs at: http://www.fws.gov/endangered/what-we-do/hcp-overview.html.

Wetlands

According to National Wetlands Inventory maps, available online at: https://www.fws.gov/wetlands/, wetlands exist within the proposed project area. If a project may impact wetlands or other important fish and wildlife habitats, the Service, in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4347) and other environmental laws and rules, recommends complete avoidance of these areas, if possible; then minimization of any adverse impacts; and finally, replacement of any lost acres; in that order. Alternatives should be examined and the least damaging practical alternative selected. If wetland impacts are unavoidable, a mitigation plan addressing the number and types of wetland acres to be impacted and the methods of replacement should be prepared and submitted to the resource agencies for review.

Native Grasslands

Native prairie is a particularly important habitat in South Dakota. In addition to the intrinsic value of diverse native prairie plant communities, these areas represent a fraction of the prairie acres that once existed in the state. These habitats harbor numerous native wildlife species, some of which cannot survive outside the native plant community. We recommend complete avoidance of direct and indirect impacts to these habitats. The likely location of these grasslands in eastern South Dakota has been identified by Bauman et al. (2016). This publication and data layers may be obtained online at: https://openprairie.sdstate.edu/data_land-easternSD/1/. Note that while native prairie is considered a conservation priority in the state, lesser-quality grasslands (e.g. grasslands with a high non-native plant component, overgrazed grasslands) can still provide habitat for wildlife and we recommend avoidance of these plant communities whenever possible. Project impacts should instead be directed toward previously disturbed land (e.g. cropland), which composes the majority of the Tatanka Ridge Wind Project area.

Birds of Conservation Concern

The Migratory Birds Division of the Service has published *Birds of Conservation Concern* [BCC] *2008*, which may be found online at:

https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf. This document is intended to identify species in need of coordinated and proactive conservation efforts among State, Federal, and private entities, with the goals of precluding future evaluation of these species for ESA protections and promoting/conserving long-term avian diversity. There are 27 species listed in the BCC document that occur within Bird Conservation Region 11 (Prairie Potholes), many of which likely inhabit the Tatanka Ridge Wind Project area. Direct and indirect effects to these species may occur with establishment of this wind facility. Primary threats impacting grassland species that occur in South Dakota are habitat loss and fragmentation. In accordance with Executive Order 13186 regarding migratory bird protection, we recommend avoidance, minimization, and finally compensation to reduce the impacts to species protected by the MBTA, including BCC species. Compliance with this law may be partially addressed in a Bird and Bat Conservation Strategy (BBCS) (identified within the WEG and explained further below).

Avian Avoidance of Wind Turbines

As indicated in the WEG, wind turbines are known to impact migratory birds directly, with post-construction mortality surveys typically recommended for 1-2 years (or more) in order to identify mortality levels. Importantly, the WEG also identifies the indirect effects of wind energy facilities such as fragmentation effects and avian avoidance of turbines resulting in displacement to other habitats. While direct impacts can readily be observed and quantified, these indirect impacts are more difficult to quantify and require more time and effort. The Before-After-Control-Impact (BACI) method for avian studies is recommended in the WEG. This study design is particularly useful in determining indirect effects of wind projects on wildlife, but such studies are rarely conducted typically due to those time/effort constraints. In the absence of robust project-specific research at every wind farm, two relatively recent studies are of particular importance to this issue of quantifying avoidance/displacement: Loesch et al. (2013) and Shaffer and Buhl (2016).

Loesch et al. (2013) evaluated breeding waterfowl pairs on wetlands at existing wind farms and reference sites in the Prairie Pothole Region. Displacement of 18% of pairs, among five waterfowls species was detected within 805 meters (0.5 mile) of wind turbines (C. Loesch, USFWS, pers. comm., 2019).

Similarly, Shaffer and Buhl (2016) evaluated wind farms and reference sites in the Prairie Pothole Region, but their research was on grassland nesting birds and also included pre-construction data, thus this study applied the BACI method. Their results also detected avoidance of turbines by seven species. The average rate of displacement out to 300 meters (0.19 mile) from wind turbines was 53% by the 5th year post construction (J. Shaffer, USGS, pers. comm., 2019). This research also detected a trend: displacement rates of grassland nesting birds continued to increase over time during that 5 years post-construction (J. Shaffer, USGS, pers. comm. 2019).

Both of these peer reviewed, published studies were conducted over multiple years, on multiple wind farms, involved large sample sizes, used reference sites for comparison, and were

conducted on wind farms in North and South Dakota where many of the same species likely to occur at Tatanka Ridge Wind Project were observed to avoid wind turbines.

In addition to the above recent research, you are likely aware of an older study of shorter duration conducted at the Buffalo Ridge wind facility in southeastern Minnesota which also identified avoidance of wind turbines by birds, this time on Conservation Reserve Program (CRP) lands: Leddy et al. 1999. CRP grasslands are areas typically planted with grass species after being cropped. CRP grasslands without turbines and areas located 180 m from turbines supported higher densities (261.0-312.5 males/100 ha) of grassland birds than areas within 80 m of turbines (58.2-128.0 males/100 ha) (Leddy et al. 1999). While native prairie is of particular importance due to its decline and native species that depend on it, planted grassland tracts also hold value for wildlife, and birds using these tracts can be displaced.

If the Tatanka Ridge Wind Project proceeds, we recommend using C. Loesch's 18% displacement of waterfowl pairs within ½ mile of turbines to quantify the number of wetlands needed to compensate for waterfowl displacement at the site and develop a plan to achieve those offsets. We also recommend quantifying grasslands within 300 m of turbines and applying the 53% displacement value via Shaffer and Buhl (2016) to determine and disclose anticipated indirect impacts to grassland nesting birds, and adding this to the offset plan. Finally, if CRP or other non-native grassland habitats will be affected by the Tatanka Ridge Wind Project, we recommend using the displacement information in Leddy et al. (1999) to develop appropriate offsets for this impact in the plan as well. This information is needed to adequately develop appropriate offsets for this form of habitat loss, and we encourage project developers to provide that plan as part of the project.

Mitigation

The Service's mitigation policy, available online at: https://www.fws.gov/policy/a1npi89_02.pdf, was established in 1981 to help assure consistent and effective mitigation recommendations that help Federal action agencies and developers plan for mitigation measures early, avoid delays, and assure equal consideration of fish and wildlife resources with other project features and purposes. Our policy adopts the definition of the term "mitigation" as stated in the NEPA regulations which includes: "(a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments."

As noted above, direct and indirect effects to wildlife are known to occur at wind energy facilities. We encourage the analysis of both types of impact and quantification of those impacts whenever possible. The mitigation methods above can be applied to reduce direct and indirect effects at any point in the process of project development; however, we recommend early planning to help ensure full implementation of any necessary mitigation measures.

Bird and Bat Conservation Strategy

Bird and bat conservation strategies are recommended in the WEG. We have developed a regional document to further assist companies in following our established national guidance on BBCSs: *U.S. Fish and Wildlife Service, Region 6, Mountain-Prairie Region Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects,* available online at: https://www.fws.gov/coloradoes/documents/Final%20R6%20BBCS%20Outline%20with%20annotation.pdf. As stated in the introduction of that document: a BBCS "…is a life-of-a-project framework for identifying and implementing actions to conserve birds and bats during wind energy project planning, construction, operation, maintenance, and decommissioning. It is the responsibility of wind energy project developers and operators to effectively assess project-related impacts to birds, bats and their habitats, and to work to avoid and minimize those impacts." A BBCS explains the actions taken by developers as they progress through the tiers of the WEG, describing the analyses, studies, and reasoning implemented with the purpose of mitigating for potential avian and bat impacts. It also addresses post-construction monitoring and habitat impacts. We recommend completion of a BBCS for this proposed energy wind facility.

Meteorological Towers

Meterological towers associated with the Tatanka Ridge Wind Project are similar to other communication towers in that they are a known mortality hazard to wildlife, particularly birds. Of primary concern is the risk of avian collision mortality. Communication towers are currently estimated to kill 6.8 million birds per year in the United States and Canada (Longcore et al. 2012). To assist developers in establishing communications towers that are more compatible with wildlife, we have developed our 2018 *Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning*, available online at: https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php. These recommendations incorporate the state of the science and the 2015 Federal Aviation Administration's *Obstruction Marking and Lighting Advisory Circular AC 70/7460-1L*, online at: https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_70_7460-1L_with_chg_1.pdf. Among the primary concerns addressed within our guidelines are the establishment of new towers on the landscape, the heights of these towers, their lighting scheme, and means of structural support. Collocation of new tower facilities on an existing structure is strongly recommended to avoid any additional impacts to migratory birds. If a new tower is necessary, placement of the new tower near other existing structures is recommended to concentrate the risk posed by the towers to relatively small areas. Minimization of tower height (below 200 feet to preclude the need for Federal Aviation Administration lighting requirements), use of only strobe or flashing lights (avoid steady-burning lights), and avoidance of guy wires (a great deal of avian mortality is a result of collisions with supporting guy wires) are important components intended to minimize potential impacts to migratory birds. The habitat at a tower location and surrounding area can also affect its level of risk to wildlife. Tower placement should occur in degraded sites avoiding ridgelines, coastal areas, wetlands or other bird concentration areas such as staging areas, rookeries, leks, and state or federal refuges. Please see the website provided above for additional information.

Overhead Power Lines

The construction of additional overhead power lines associated with wind farms creates the threat of avian electrocution, particularly for raptors. Thousands of these birds, including endangered species, are killed annually as they attempt to utilize overhead power lines as nesting, hunting, resting, feeding, and sunning sites. The Service recommends the installation of underground, rather than overhead, power lines whenever possible/appropriate to minimize environmental disturbances. For all new overhead lines or modernization of old overhead lines, we recommend incorporating measures to prevent avian electrocutions. The publication entitled *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* includes many measures to reduce risk to birds including pole extensions, modified positioning of live phase conductors and ground wires, placement of perch guards and elevated perches, elimination of cross arms, use of wood (not metal) braces, and installation of various insulating covers. You may obtain this publication by contacting the Edison Electric Institute via their website at: http://www.eei.org/resourcesandmedia/products/Pages/products.aspx, or by calling 202-508-5000.

Please note that utilizing just one of the "*Suggested Practices . . .*" methods may not entirely remove the threat of electrocution to raptors. In fact, improper use of some methods may increase electrocution mortality. Perch guards, for example, may be only partially effective as some birds may still attempt to perch on structures with misplaced or small-sized guards and suffer electrocution as they approach too close to conducting materials. Among the most dangerous structures to raptors are poles that are located at a crossing of two or more lines, exposed above-ground transformers, or dead end poles. Numerous hot and neutral lines at these sites, combined with inadequate spacing between conductors, increase the threat of raptor electrocutions. Perch guards placed on other poles has, in some cases, served to actually shift birds to these more dangerous sites, increasing the number of mortalities. Thus, it may be necessary to utilize other methods or combine methods to achieve the best results. The same principles may be applied to substation structures.

Please also note that the spacing recommendation within the "*Suggested Practices . . .*" publication of at least 60 inches between conductors or features that cause grounding may not be protective of larger raptors such as eagles. This measure was based on the fact that the skin-to-skin contact distance on these birds (i.e., talon to beak, wrist to wrist, etc.) is less than 60 inches. However, an adult eagle's wingspan (distance between feather tips) may vary from 66 to 96 inches depending on the species (golden or bald) and gender of the bird, and unfortunately, wet feathers in contact with conductors and/or grounding connections can result in a lethal electrical surge. Thus, the focus of the above precautionary measures should be to a) provide more than 96 inches of spacing between conductors or grounding features, b) insulate exposed conducting features so that contact will not cause raptor electrocution, and/or c) prevent raptors from perching on the poles in the first place.

Additional information regarding simple, effective ways to prevent raptor electrocutions on power lines is available in video form. *Raptors at Risk* may be obtained by contacting EDM International, Inc. at 4001 Automation Way, Fort Collins, Colorado 80525-3479, Telephone No.

(970) 204-4001, or by visiting their website at:
https://www.edmlink.com/component/zoo/item/video-raptors-at-risk.

In addition to electrocution, overhead power lines also present the threat of avian line strike mortality. Particularly in situations where these lines are adjacent to wetlands or where waters exist on opposite sides of the lines, we recommend marking them in order to make them more visible to birds. For more information on bird strikes, please see *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* which, again, may be obtained by contacting the Edison Electric Institute via their website at:
http://www.eei.org/resourcesandmedia/products/Pages/products.aspx, or by calling 202-508-5000.

While marking of power lines reduces line strike mortality, it does not preclude it entirely. Thus, marking of additional, existing, overhead lines is recommended to further offset the potential for avian line strike mortality.

Summary

Below we reiterate items above that are pertinent to the proposed project:

- Wind energy guidelines:
  - *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines* http://www.fws.gov/windenergy/
  - South Dakota Game, Fish and Parks *Siting Guidelines for Wind Power Projects in South Dakota* https://gfp.sd.gov/userdocs/docs/wind-energy-guidelines.pdf

- Service land interests:
  - Contact Madison WMD

- Eagle guidance:
  - Bald and Golden Eagle Protection Act (BGEPA)
  - *National Bald Eagle Management Guidelines* https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf
  - *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy Version 2* https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf
  - Eagle take permit https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/2016-29908.pdf
  - *Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities* https://www.fws.gov/coloradoes/documents/Final_GOEA_Buffer_Recommendations_AvoidanceMinimization_WindFacilities_April_10_2013.pdf

- *Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from USFWS Region 6*
  https://www.fws.gov/coloradoes/documents/Final_USFWS_R6_ECP_guidance.pdf

- Threatened/endangered species - Endangered Species Act (ESA):
  - Topeka shiner
  - Rufa red knot
  - Northern long-eared bat
  - Dakota skipper
  - Poweshiek skipperling

- Wetlands – avoid, minimize, compensate for unavoidable impacts:
  https://www.fws.gov/wetlands/

- Native Grasslands – identify, avoid, minimize:
  - Bauman et al. 2016 inventory of untilled land
    https://openprairie.sdstate.edu/data_land-easternSD/1/

- Birds of Conservation Concern - *Birds of Conservation Concern 2008:*
  https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

- Avian Avoidance of Wind Turbines - compensate for unavoidable indirect impacts::
  - Loesch et al. (2013) – displacement of waterfowl
  - Shaffer and Buhl (2016) – displacement of grassland nesting birds
  - Leddy et al. (1999) – displacement of grassland nesting birds in CRP

- Mitigation - 1981 Service Policy: https://www.fws.gov/policy/a1npi89_02.pdf

- Bird and Bat Conservation Strategy – WEG and *U.S. Fish and Wildlife Service, Region 6, Mountain-Prairie Region Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects:*
  https://www.fws.gov/coloradoes/documents/Final%20R6%20BBCS%20Outline%20with%20annotation.pdf

- Meteorological Towers:
  - *2018 Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning*
    https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php
  - 2015 Federal Aviation Administration Obstruction Marking and Lighting Advisory Circular AC70/7460-1L
    https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_70_7460-1L_with_chg_1.pdf

- Overhead Power Lines:
  - *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*
    http://www.eei.org/resourcesandmedia/products/Pages/products.aspx
  - *Raptors at Risk* video
    https://www.edmlink.com/component/zoo/item/video-raptors-at-risk
  - *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*
    http://www.eei.org/resourcesandmedia/products/Pages/products.aspx

Literature Cited

Bauman, P., B. L. Carlson, and T. Butler. 2016. Quantifying undisturbed (native) lands in eastern South Dakota:2013. South Dakota State University.

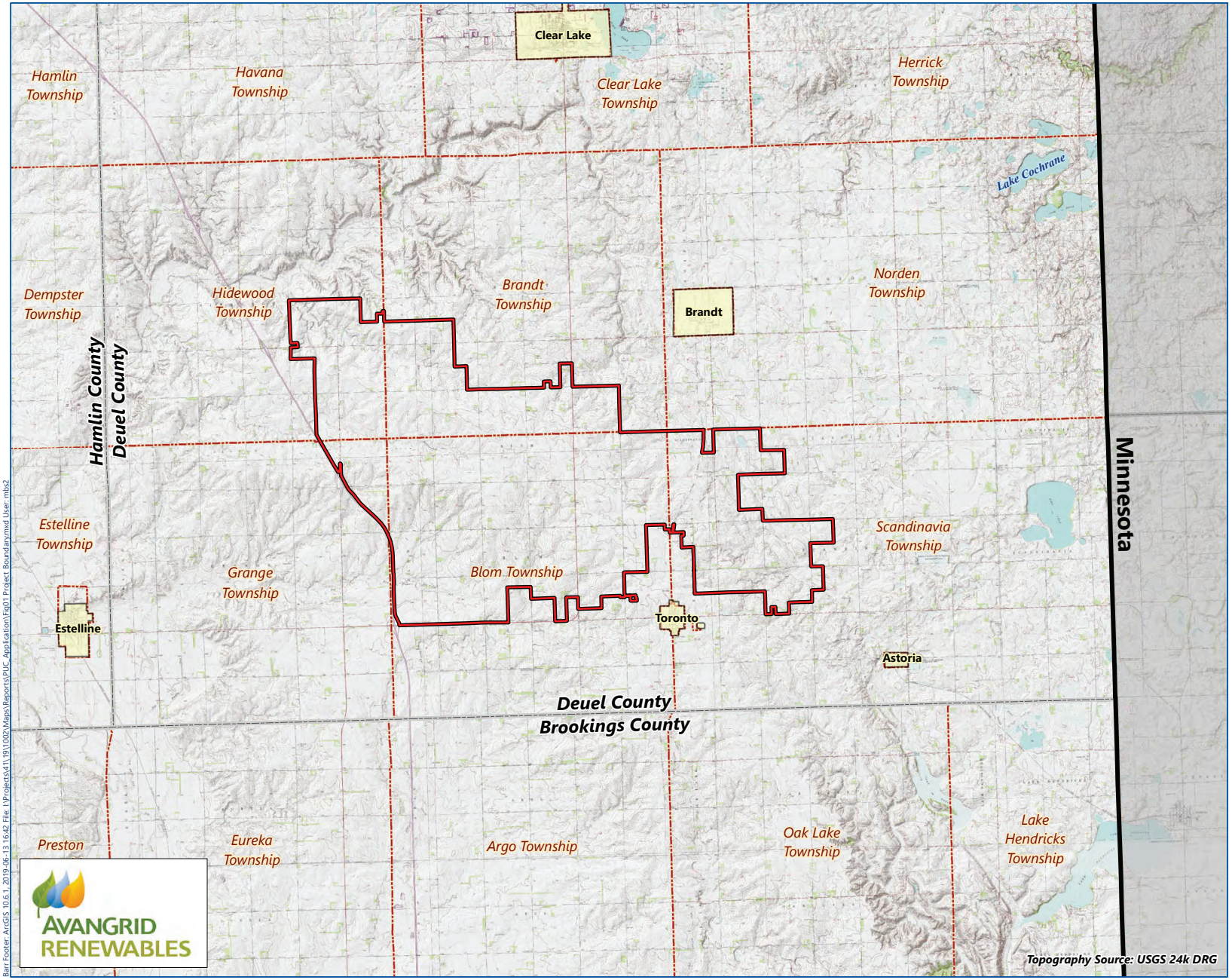
Leddy, K. L, K. F. Higgins, D. E. Naugle. 1999. Effects of wind turbines on upland nesting birds in Conservation Reserve Program grasslands. Wilson Bulletin 111(1):100-104.

Loesch, C. R., J. A. Walker, R. E. Reynolds, J. S. Gleason, N. D. Niemuth, S. E. Stephens, and M. A. Erickson. 2013. Effect of wind energy development on breeding duck densities in the Prairie Pothole Region. Journal of Wildlife Management 77(3):587-598.

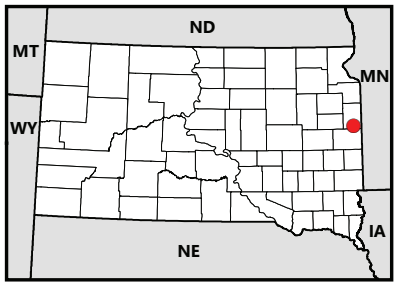
Longcore, T., C. Rich, P. Mineau, B. MacDonald, D.G. Bert, L.M. Sullivan, E. Mutrie, S.A. Gauthreaux, M.L. Avery, R.L. Crawford, A.M. Manville, E.R. Travis, and D. Drake. 2012. An estimate of avian mortality at communication towers in the United States and Canada. PLoS One 7(4): 1-17.

Shaffer, J. A. and D. A. Buhl. 2016. Effects of wind-energy facilities on breeding grassland bird distributions. Conservation Biology 30(1):59-71.

Figures



Project Boundary
Municipality
Civil Township Boundary
County Boundary
State Boundary



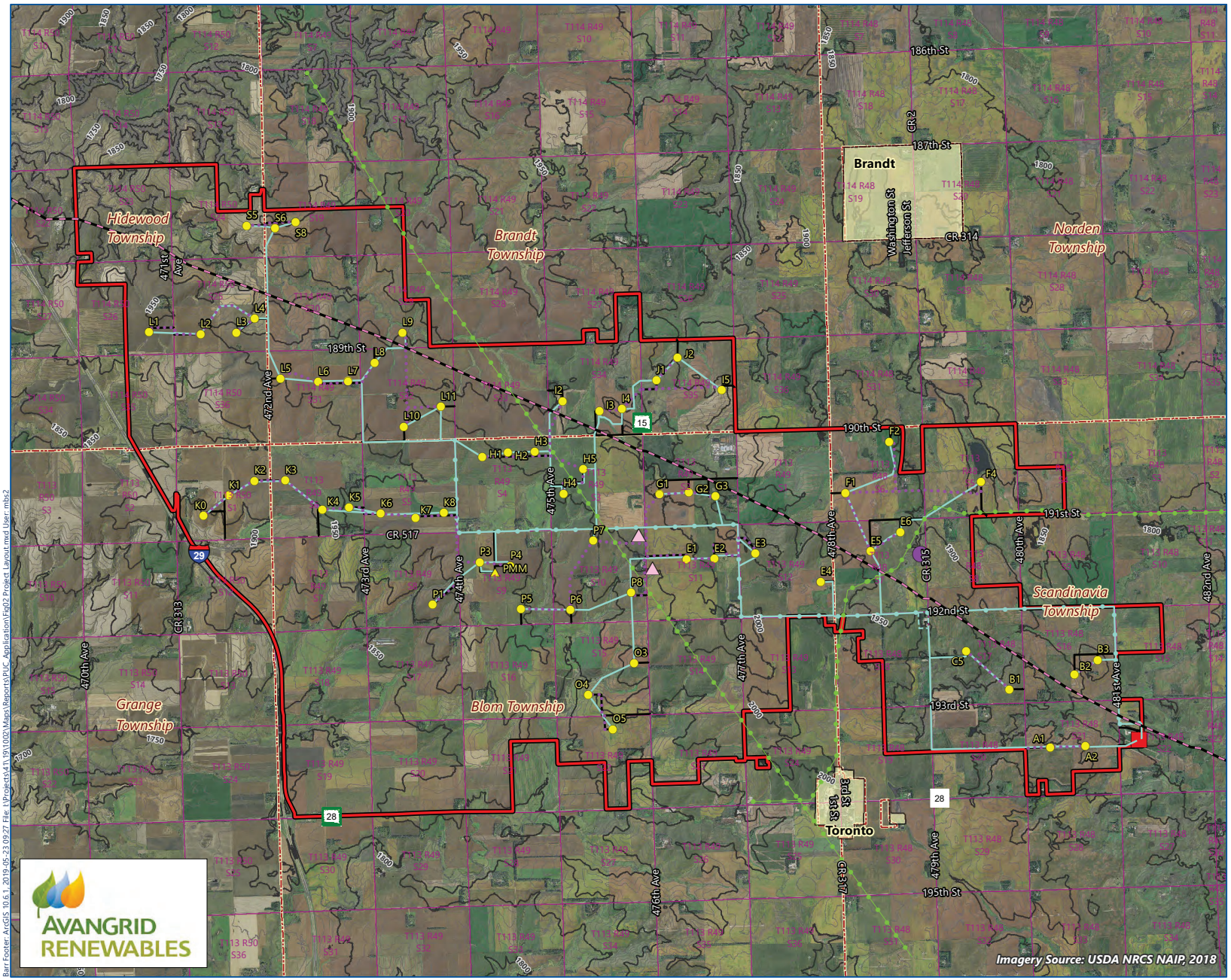
Miles
2 0 2

Kilometers
3 0 3

Figure 1

PROJECT BOUNDARY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-06-13 16:42 File: I:\Projects\411\191002\Maps\Reports\PUC_Application\Fig01 Project Boundary.mxd User: mbs2



- Turbine Location
- Met Tower Location
- Laydown Area
- O&M Building
- Substation
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Final Alignment To Be Determined
- Existing Underground Pipeline
- Existing Overhead Transmission Line

LiDAR Surface Contours

- 50 Foot Contour
- 10 Foot Contour
- Project Boundary
- Municipality
- Public Land Survey Section
- Civil Township Boundary
- County Boundary

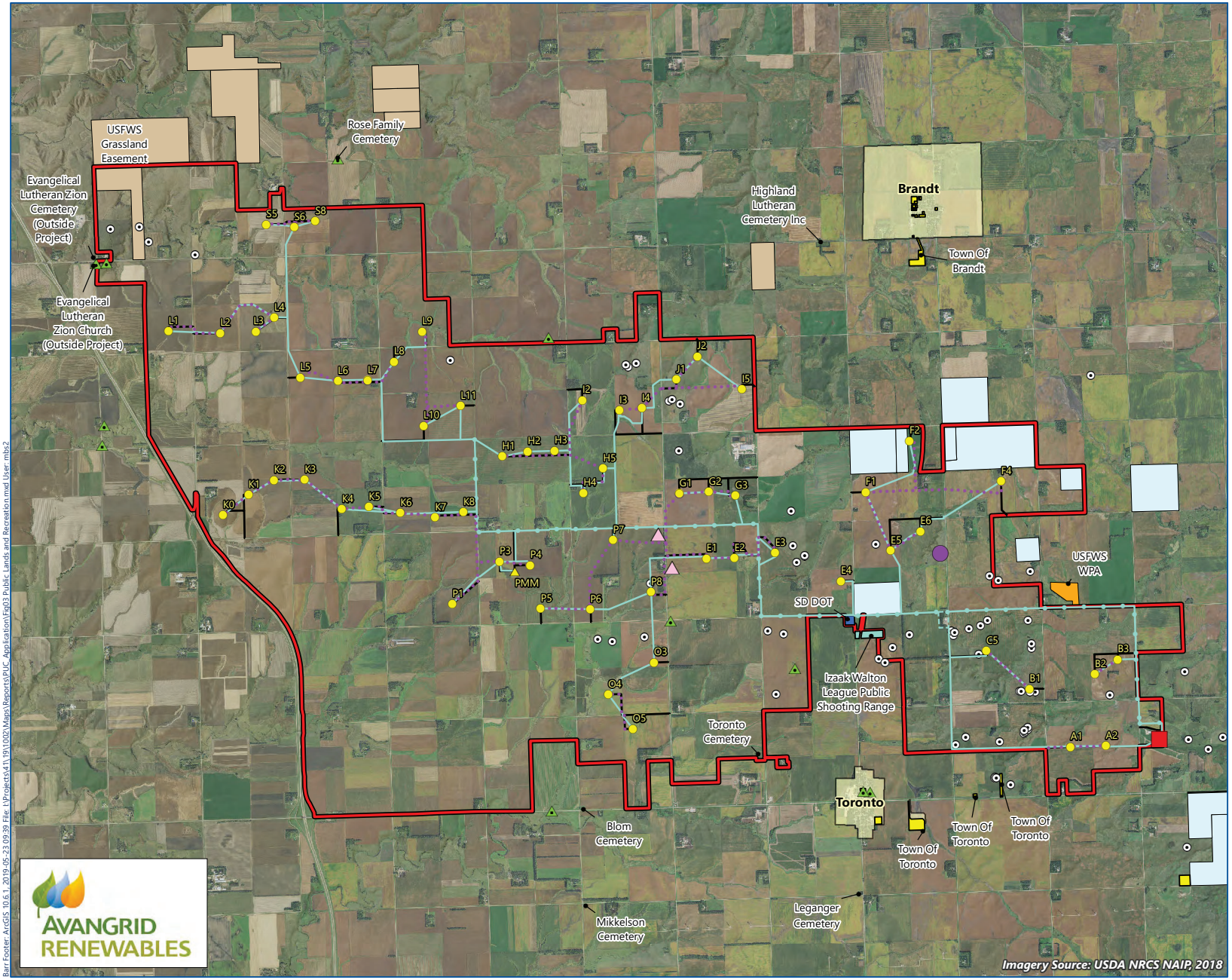
Miles
1 0 1

Kilometers
1.5 0 1.5

Figure 2

PROJECT LAYOUT
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Foster ArcGIS 10.6.1, 2019-05-23 09:27 File: I:\Projects\411.19\1002\Maps\Reports\PUC_Application\Fig02 Project Layout.mxd User: mbs2



AVANGRID RENEWABLES

Barr Foster ArcGIS 10.6.1, 2019-05-23 09:39 File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig03 Public Lands and Recreation.mxd User: mbs2

CONFIDENTIAL

- Turbine Location
- Met Tower Location
- Proposed Laydown
- Proposed O&M
- Proposed Substation
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Final Alignment To Be Determined
- Identified Architectural/Historical Site
- Identified Archaeological Site
- Project Boundary
- Municipality
- County Boundary

U.S. Fish & Wildlife Service Lands

- Grassland Easement
- Wetland Easement
- Waterfowl Production Area

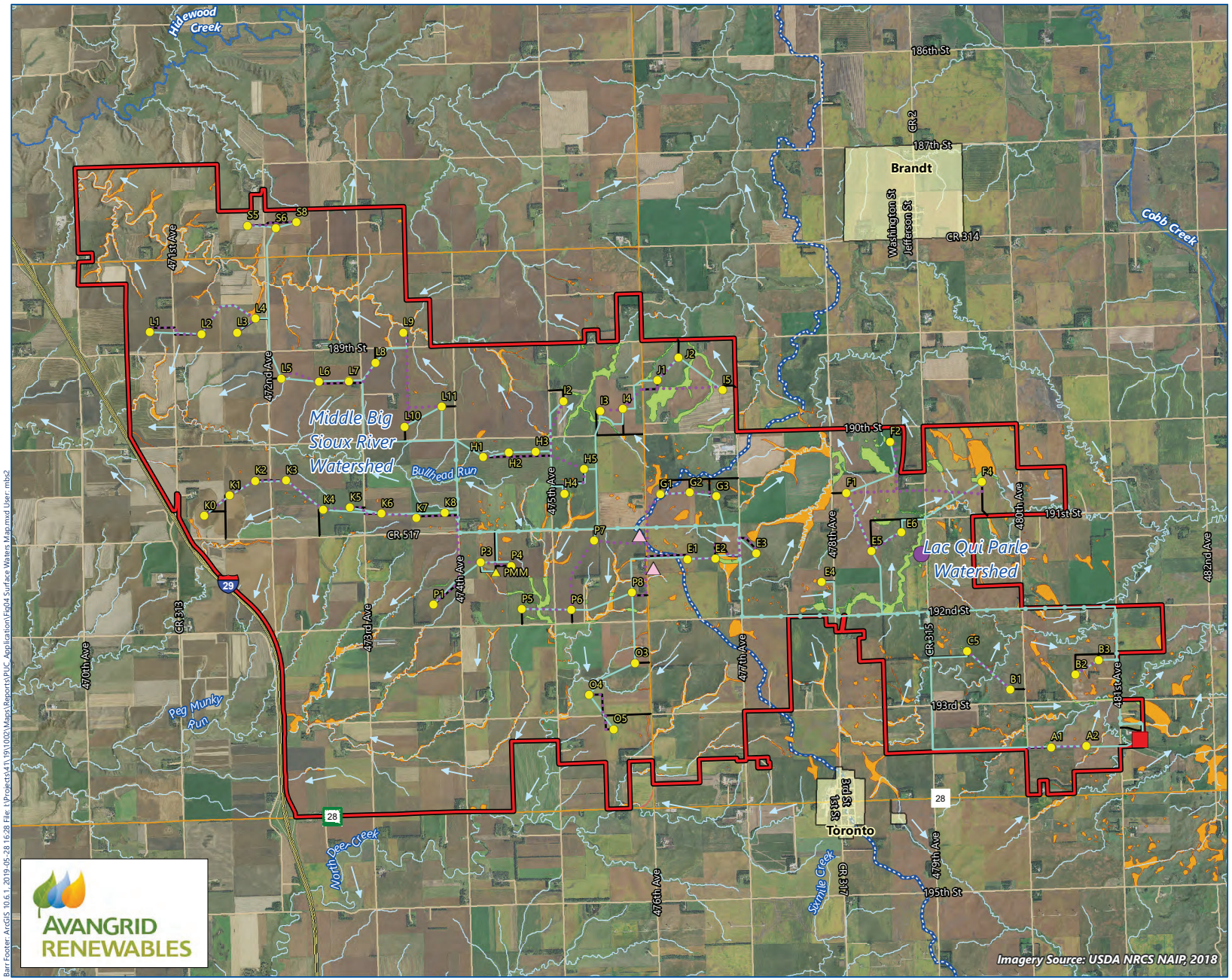
Public Lands and Recreation (2017 Parcels)

- Isaak Walton League
- Municipal
- Department of Transportation

Miles
1 0 1
Kilometers
1.5 0 1.5

Figure 3

PUBLIC LANDS AND RECREATION
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota



- Turbine Location
- Met Tower Location
- Proposed Laydown
- Proposed O&M
- Proposed Substation
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Final Alignment To Be Determined
- Flow Direction
- Intermittent Stream (USGS NHD)
- Perennial Stream/River (USGS NHD)
- Freshwater Emergent (PEM) Wetland (Field-Delineated Data)
- Potential Aquatic Resource (Desktop-Level Data)
- Project Boundary
- Watershed Boundary (USGS NHD, HUC-8)

Geological Survey (U.S.). "National Hydrography Dataset." [Reston, Va.] :U.S. Dept. of the Interior, U.S. Geological Survey, 2019.

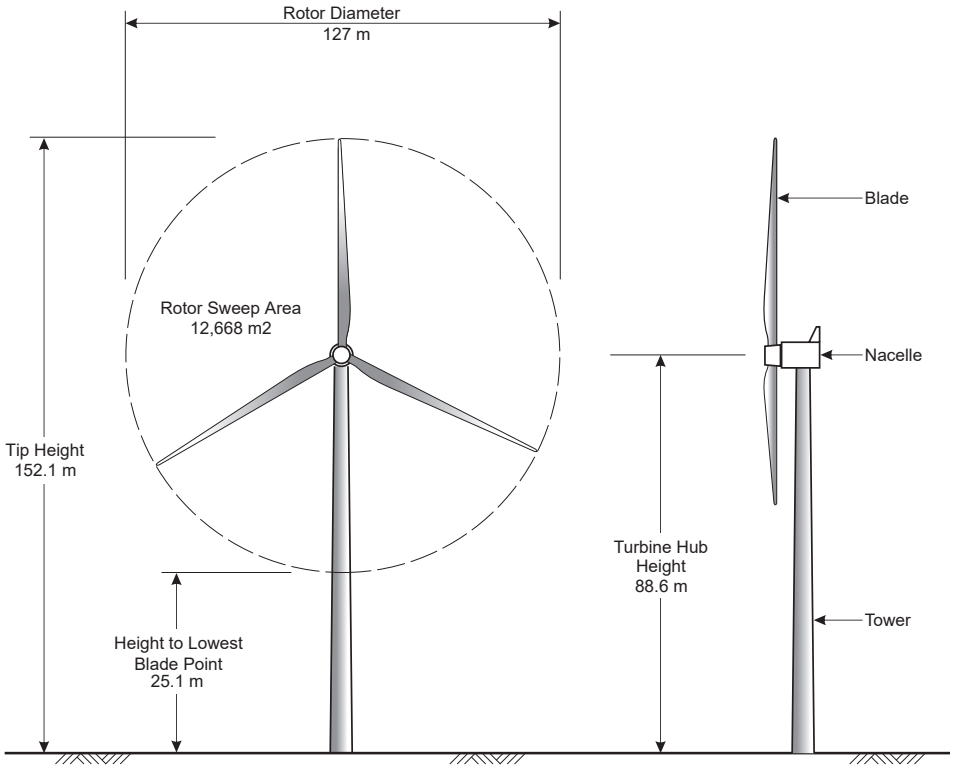
Miles
1 0 1

Kilometers
1.5 0 1.5

Figure 4

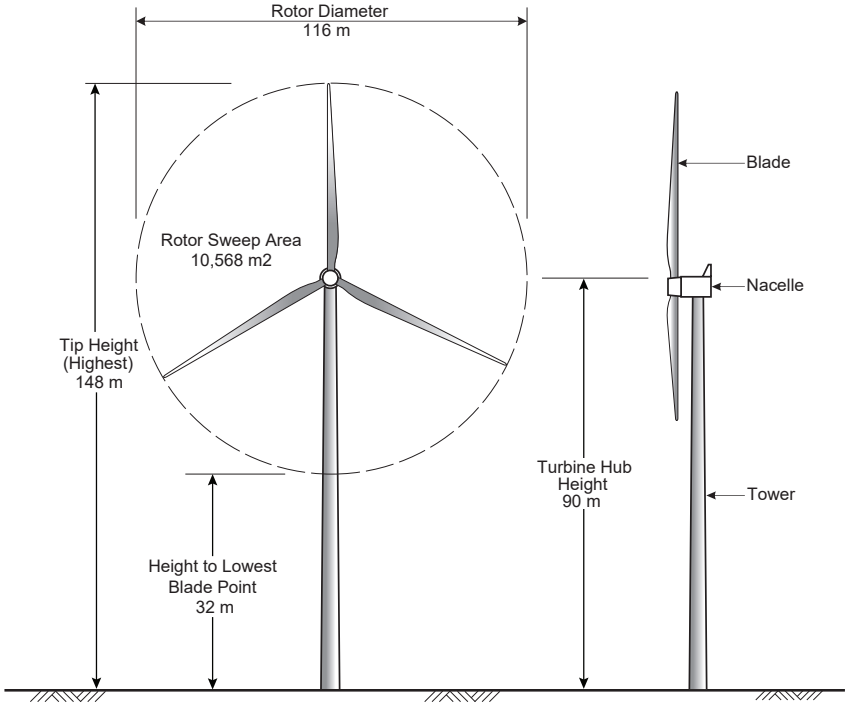
SURFACE WATERS
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Foster ArcGIS 10.6.1, 2019-05-28 16:28 File: I:\Projects\411\191002\Maps\Reports\PUC_Application\Fig04 Surface Waters Map.mxd User: mbc2



MODEL GE2.82-127 WIND TURBINE DESIGN

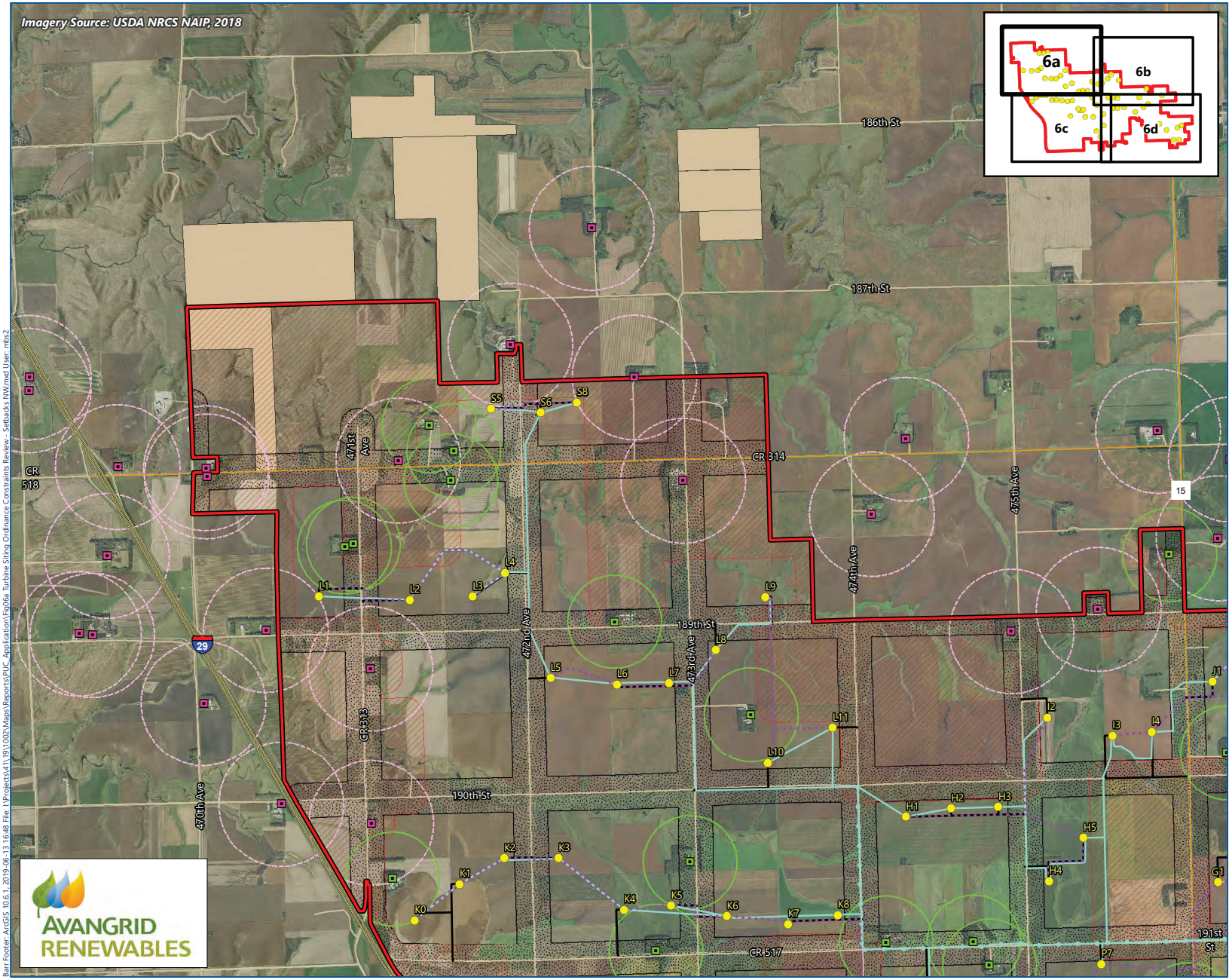
Not to scale



MODEL GE2.3 - 116 WIND TURBINE DESIGN

FIGURE 5
WIND TURBINE DESIGN FEATURES
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Duel County, South Dakota

\\barr.com\projects\Mpls\41 SD\194119\002 Tatanka Ridge Wind Survey\WorkFiles\South Dakota PUC\Figures\Support\Fig5 Wind Turbine Design Features.ai



Turbine Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground

Non-Participating Occupied Residence, Business or Public Building*

Participating Occupied Residence, Business or Public Building*

Project Boundary

U.S. Fish & Wildlife Service Lands

Grassland Easement

Property Setbacks

Non-Participating Residence Setback
Participating Residence Setback
Non-Participating Property Setback
Public Road Right-of-Way Setback

** Figure only shows residences within 1 mile of Project Boundary.*

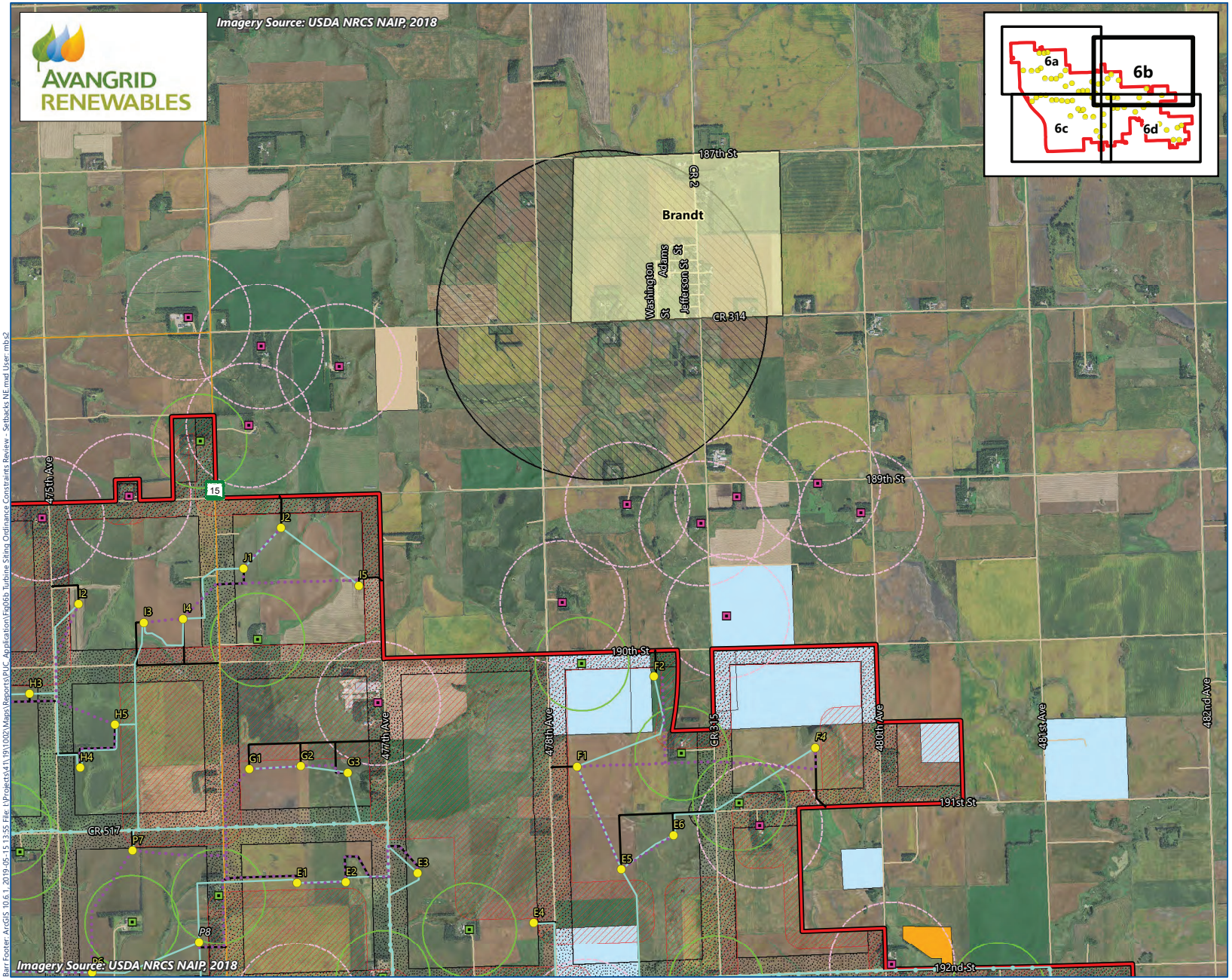
Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 6a

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW - SETBACKS - NORTHWEST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Foster ArcGIS 10.6.1, 2019-06-13 16:48 File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig06a_Turbine Siting Ordinance Constraints Review - Setbacks-NW.mxd User: mbc2



Turbine Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground

Non-Participating Occupied Residence, Business or Public Building*
Participating Occupied Residence, Business or Public Building*
Project Boundary
Municipality

U.S. Fish & Wildlife Service Lands

Grassland Easement
Wetland Easement
U.S. Fish & Wildlife Service

Property Setbacks

Non-Participating Residence Setback
Participating Residence Setback
Non-Participating Property Setback
Public Road Right-of-Way Setback

Municipal Setbacks

Brandt - 1 mile from Nearest Residence

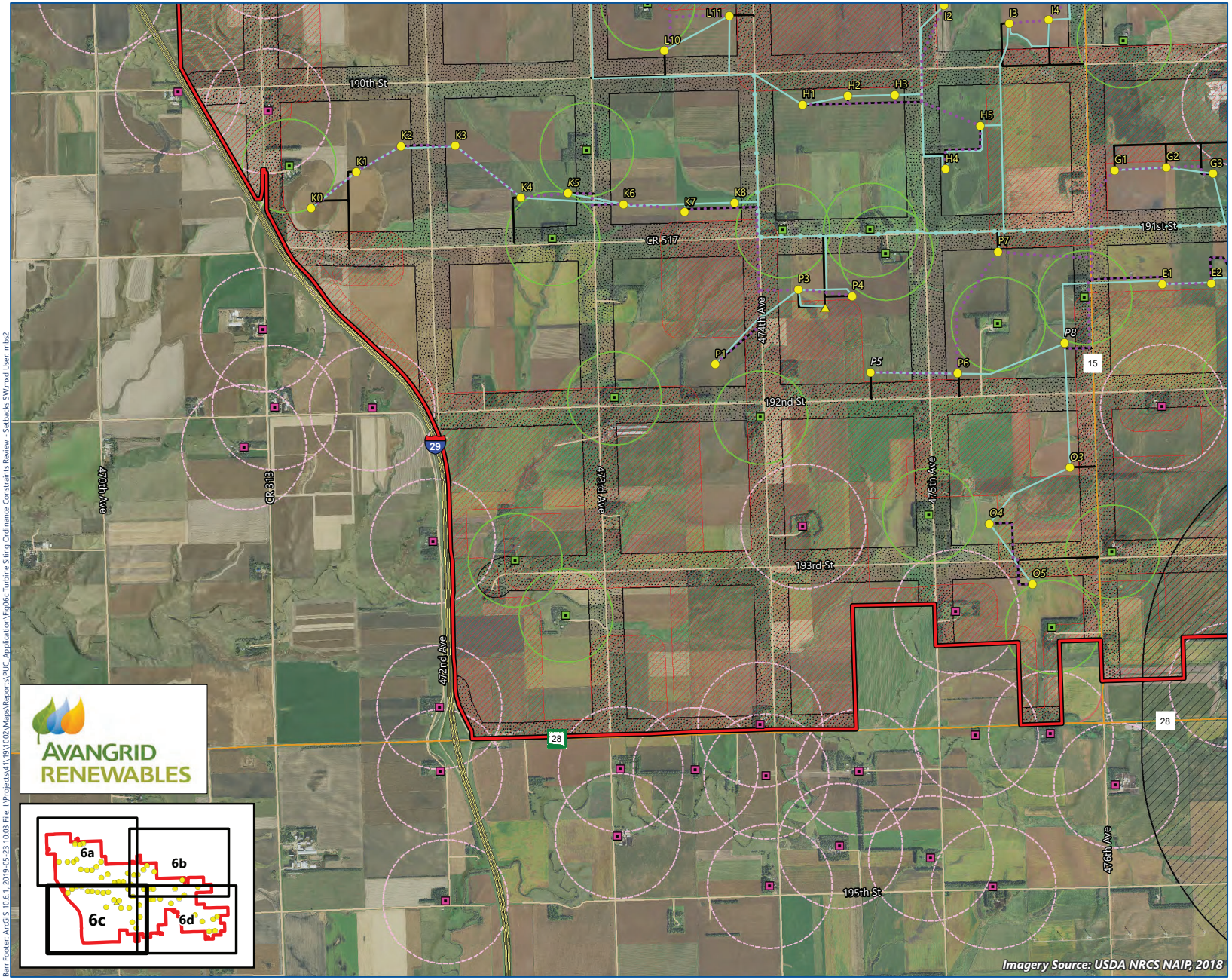
** Figure only shows residences within 1 mile of Project Boundary.*

Feet
3,000 0 3,000
Meters
1,000 0 1,000

Figure 6b

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW - SETBACKS - NORTHEAST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Foster ArcGIS 10.6.1, 2019-05-15 13:55 File: I:\Projects\411911002\Maps\Reports\PUC Application\Fig06b Turbine Siting Ordinance Constraints Review - Setbacks NE.mxd User: mbc2



AVANGRID RENEWABLES

- Turbine Location
- Met Tower Location
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Non-Participating Occupied Residence, Business or Public Building*
- Participating Occupied Residence, Business or Public Building*
- Project Boundary

Property Setbacks

- Non-Participating Residence Setback
- Participating Residence Setback
- Non-Participating Property Setback
- Public Road Right-of-Way Setback
- Toronto - 1.5 miles from Municipal Boundary

** Figure only shows residences within 1 mile of Project Boundary.*

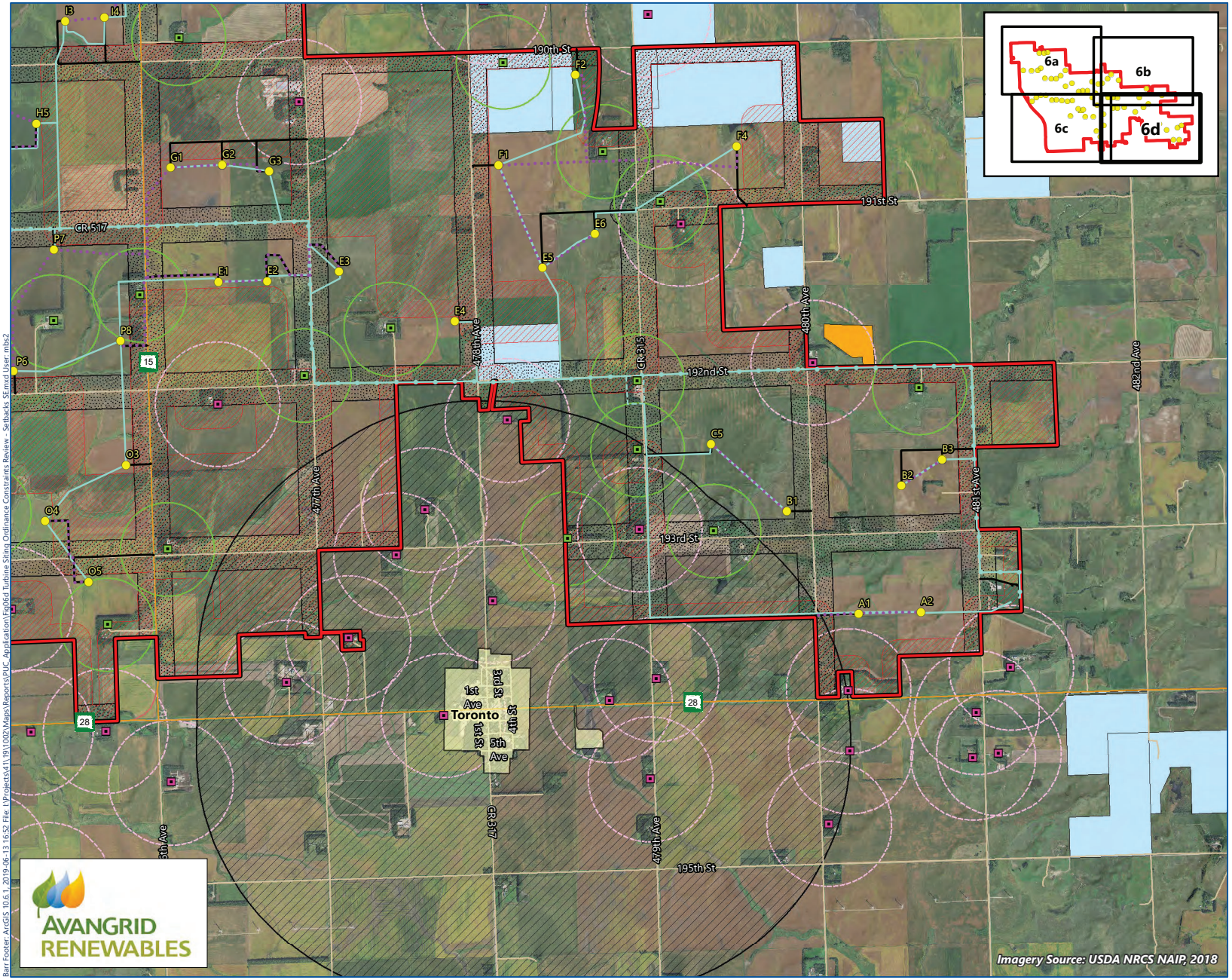
Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 6c

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW
- SETBACKS - SOUTHWEST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-05-23 10:03, File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig06c_Turbine Siting Ordinance Constraints Review - Setbacks SW.mxd User: mbc2



Turbine Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground
Final Alignment To Be Determined
Non-Participating Occupied Residence, Business or Public Building*
Participating Occupied Residence, Business or Public Building*
Project Boundary
Municipality

U.S. Fish & Wildlife Service Lands

Wetland Easement
Waterfowl Production Area

Property Setbacks

Non-Participating Residence Setback
Participating Residence Setback
Non-Participating Property Setback
Public Road Right-of-Way Setback

Municipal Setbacks

Toronto - 1.5 miles from Municipal Boundary

** Figure only shows residences within 1 mile of Project Boundary. Residences within the town of Toronto were not included in the field survey.*

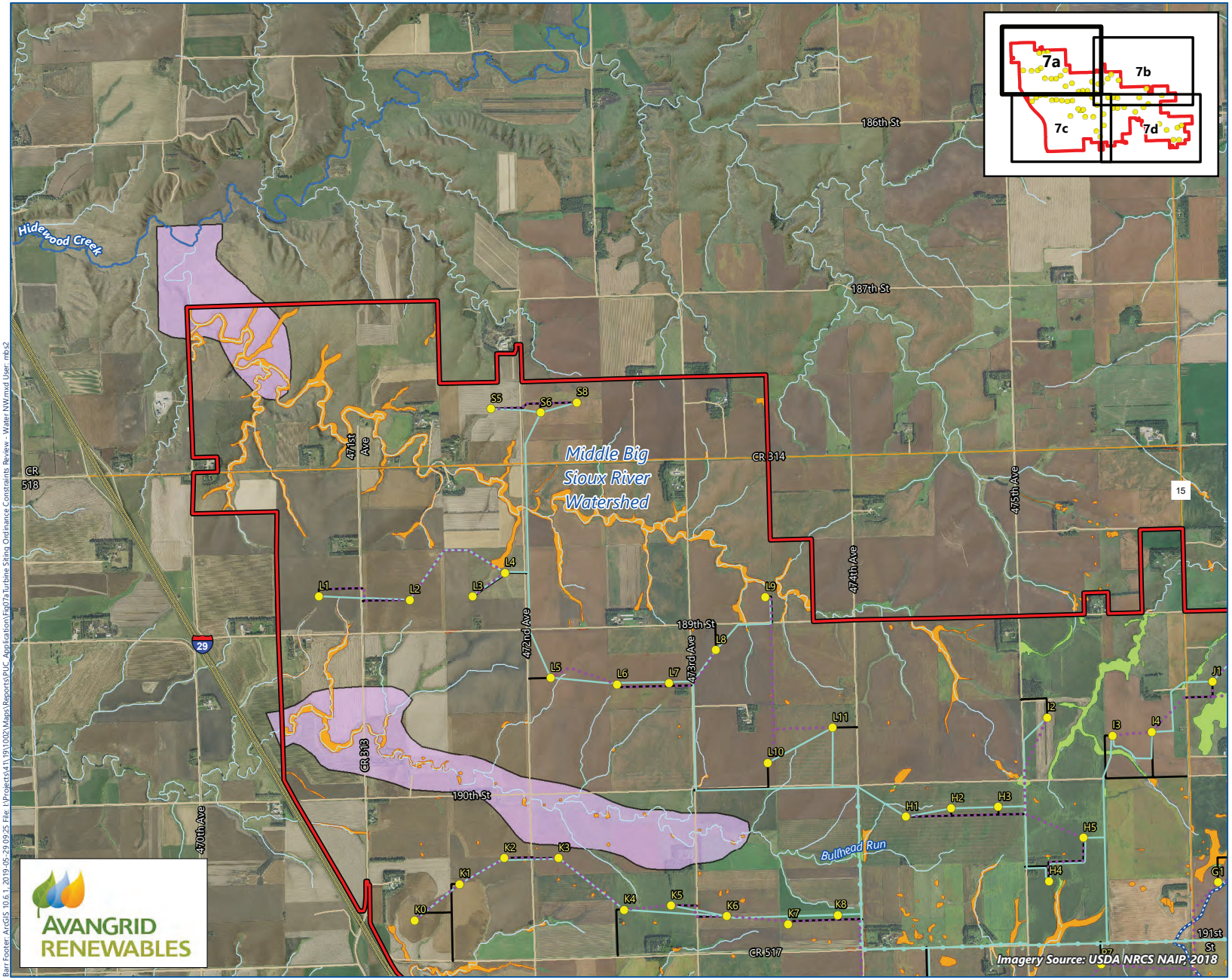
Feet
3,000 0 3,000
Meters
1,000 0 1,000

Figure 6d

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW - SETBACKS - SOUTHEAST -

Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-06-13 16:52, File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig06d Turbine Siting Ordinance Constraints Review - Setbacks SE.mxd User: mbs2



Turbine Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground

Intermittent Stream (USGS NHD)
Perennial Stream/River (USGS NHD)
Freshwater Emergent (PEM) Wetland (Field-Delineated Data)
Potential Aquatic Resource (Desktop-Level Data)
Project Boundary
Municipality
Watershed Boundary (USGS NHD, HUC-8)

Groundwater Protection Zones

(East Dakota Water Development District)

Zone A - Wellhead Protection Area
Zone B - Shallow Aquifer Boundaries and Areas Contributing Drainage to Zone A

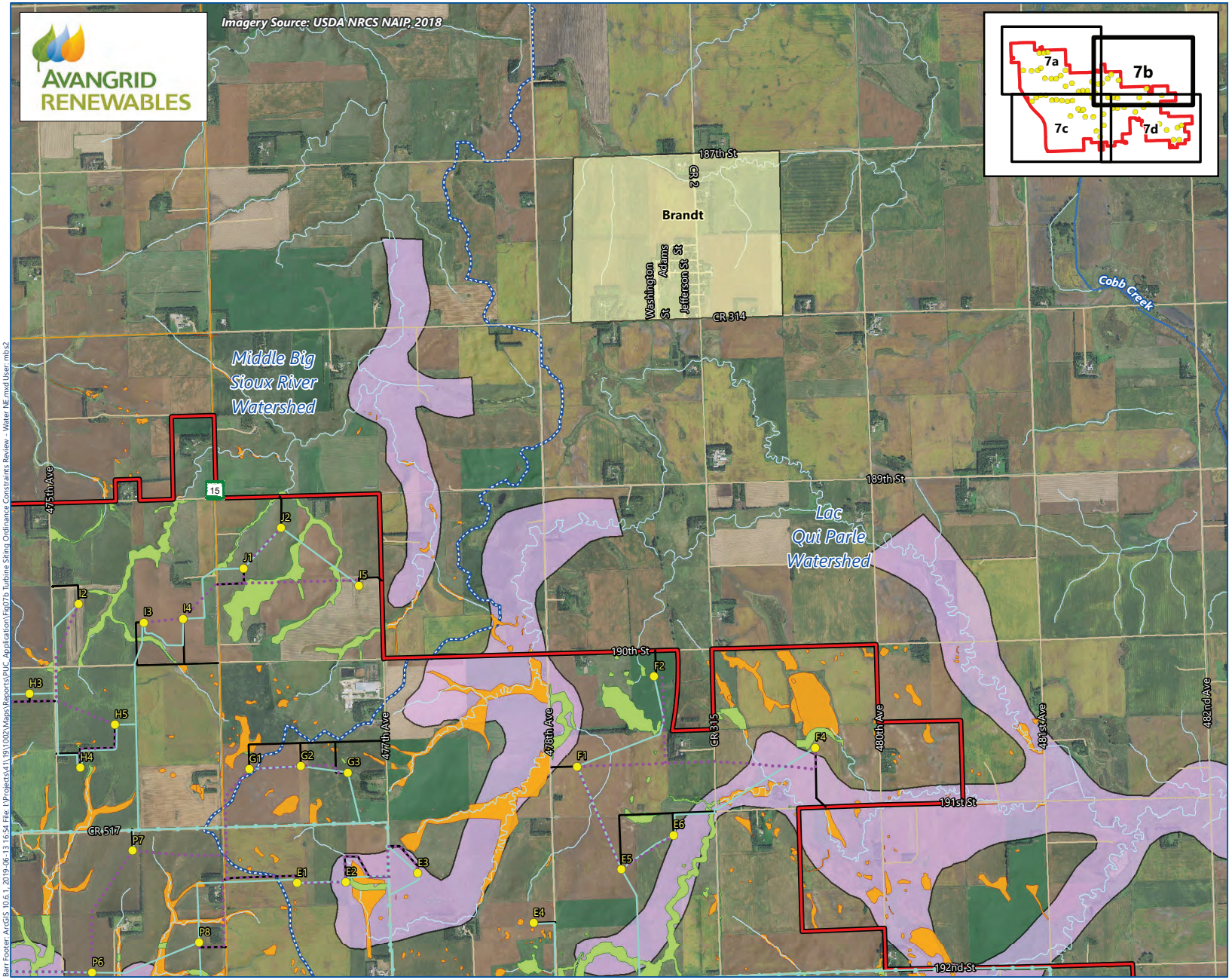
Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 7a

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW
- WATER FEATURES - NORTHWEST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-05-29 09:25 File: I:\Projects\411\19\1002\Maps\Reports\PUC_Application\Fig07a Turbine Siting Ordinance Constraints Review - Water NW.mxd User: mb-s2



Turbine Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground

Intermittent Stream (USGS NHD)
Perennial Stream/River (USGS NHD)
Freshwater Emergent (PEM) Wetland (Field-Delineated Data)
Potential Aquatic Resource (Desktop-Level Data)
Project Boundary
Municipality
Watershed Boundary (USGS NHD, HUC-8)

Groundwater Protection Zones

(East Dakota Water Development District)

Zone A - Wellhead Protection Area
Zone B - Shallow Aquifer Boundaries and Areas Contributing Drainage to Zone A

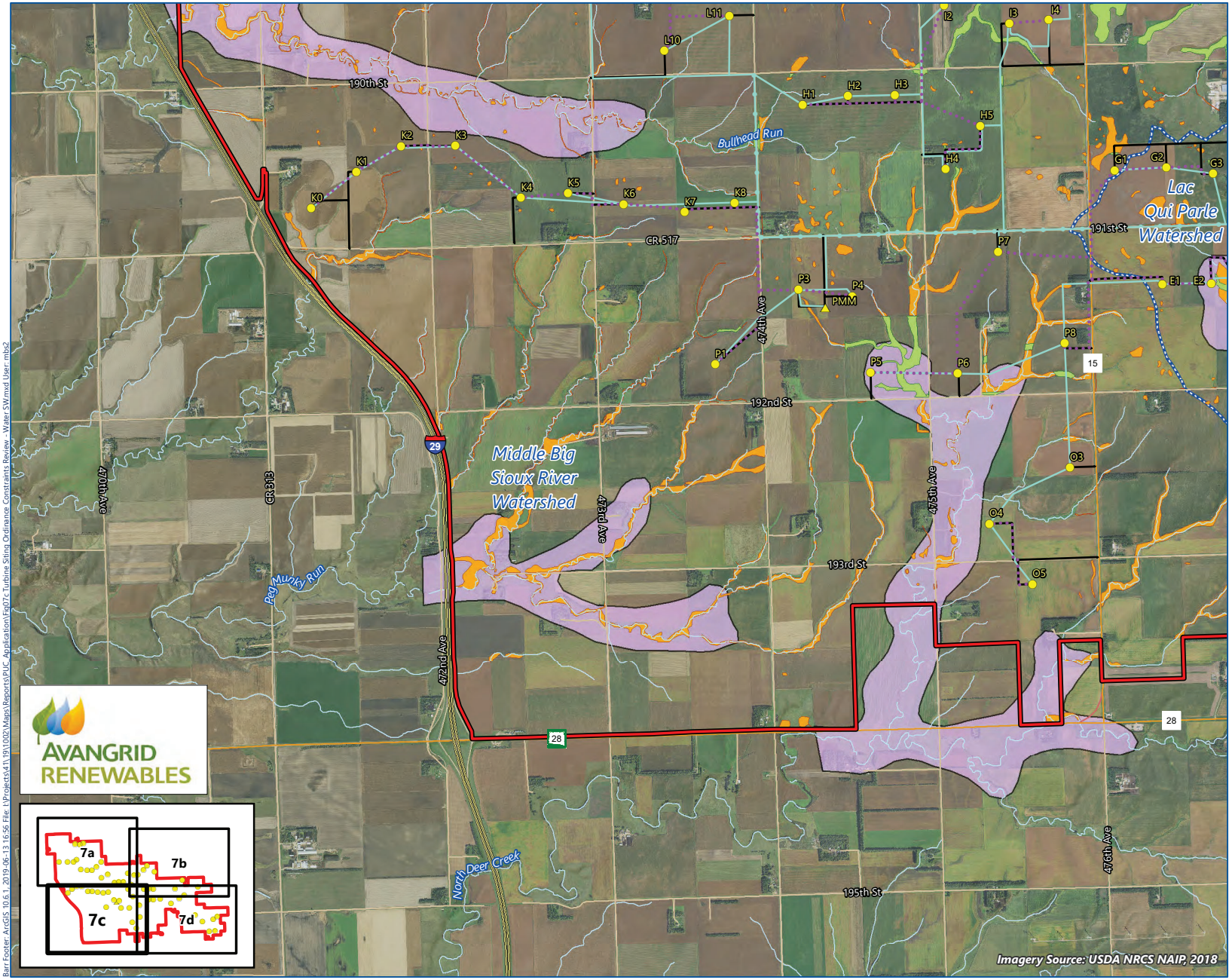
Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 7b

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW
- WATER FEATURES - NORTHEAST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer ArcGIS 10.6.1, 2019-06-13 16:54, File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig07b Turbine Siting Ordinance Constraints Review - Water NE.mxd User: mb2



AVANGRID RENEWABLES

- Turbine Location
- Met Tower Location
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Intermittent Stream (USGS NHD)
- Freshwater Emergent (PEM) Wetland (Field-Delineated Data)
- Potential Aquatic Resource (Desktop-Level Data)
- Project Boundary
- Municipality
- Watershed Boundary (USGS NHD, HUC-8)

Groundwater Protection Zones

(East Dakota Water Development District)

- Zone A - Wellhead Protection Area
- Zone B - Shallow Aquifer Boundaries and Areas Contributing Drainage to Zone A

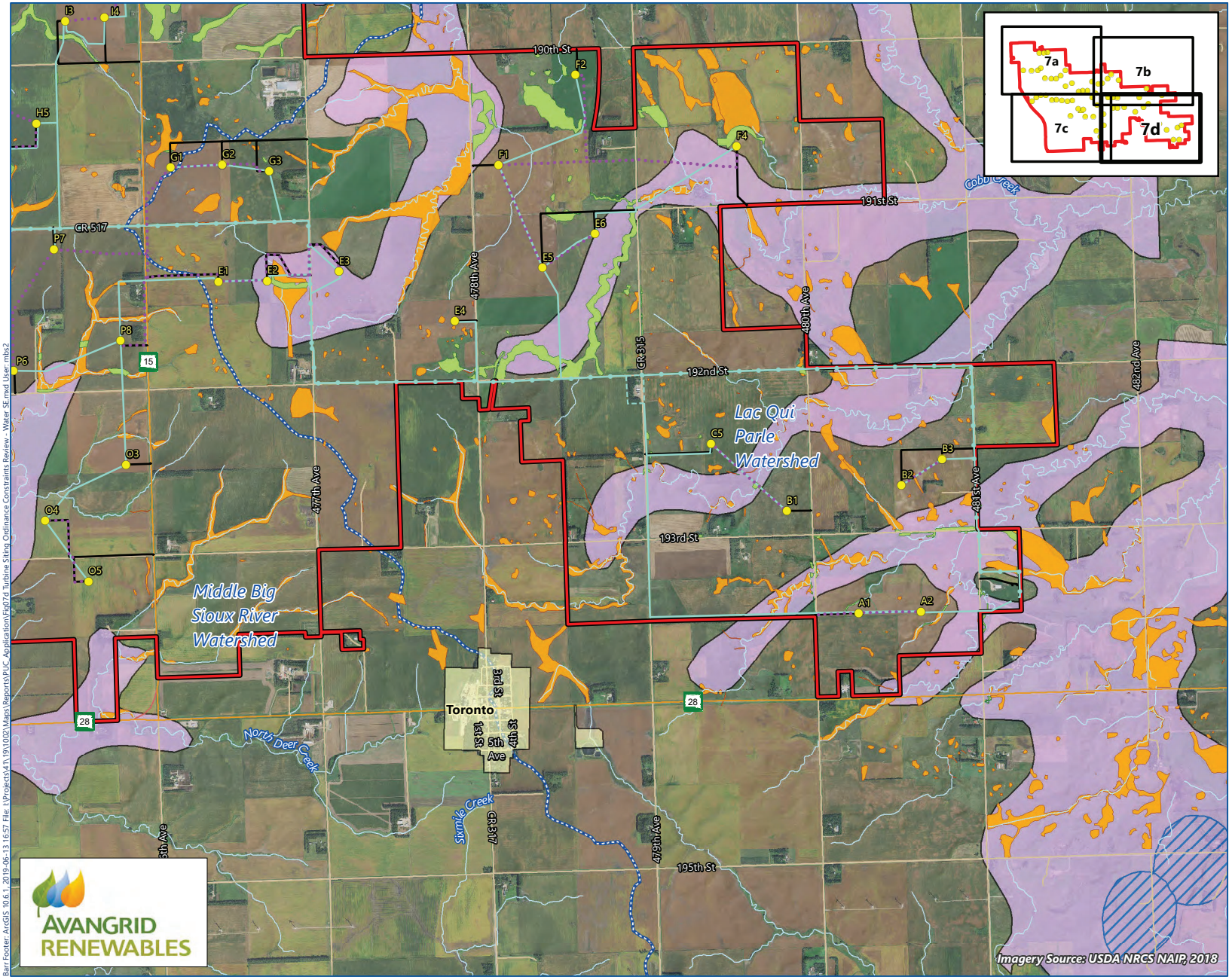
Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 7c

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW
- WATER FEATURES - SOUTHWEST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-06-13 16:56, File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig07c-Turbine Siting Ordinance Constraints Review - Water SW.mxd User: mbc2



Turbine Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground
Final Alignment To Be Determined
Intermittent Stream (USGS NHD)
Freshwater Emergent (PEM) Wetland (Field-Delineated Data)
Potential Aquatic Resource (Desktop-Level Data)
Project Boundary
Municipality
Watershed Boundary (USGS NHD, HUC-8)

Groundwater Protection Zones

(East Dakota Water Development District)

Zone A - Wellhead Protection Area
Zone B - Shallow Aquifer Boundaries and Areas Contributing Drainage to Zone A

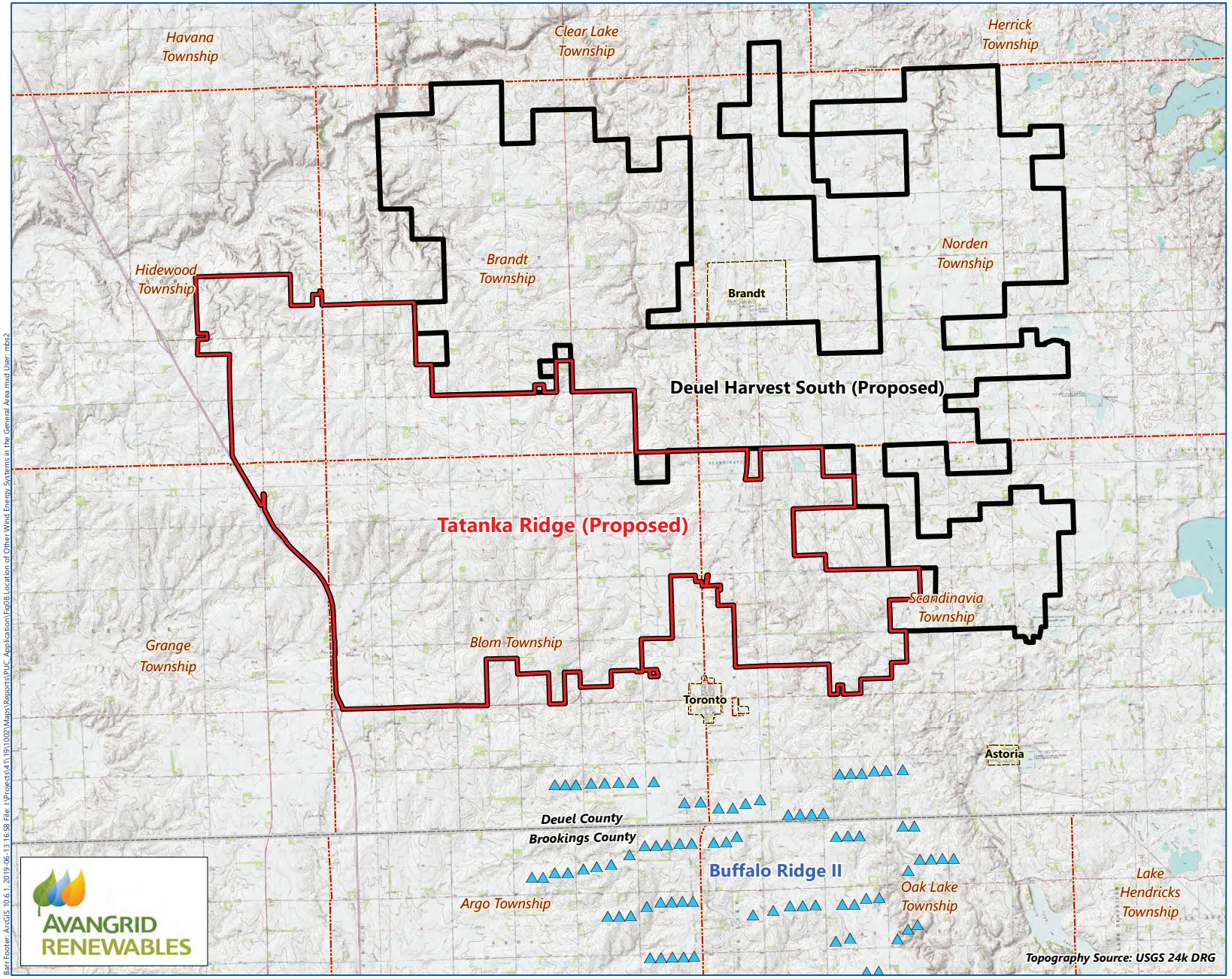
Feet
3,000 0 3,000

Meters
1,000 0 1,000

Figure 7d

TURBINE SITING ORDINANCE CONSTRAINTS OVERVIEW
- WATER FEATURES - SOUTHEAST -
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

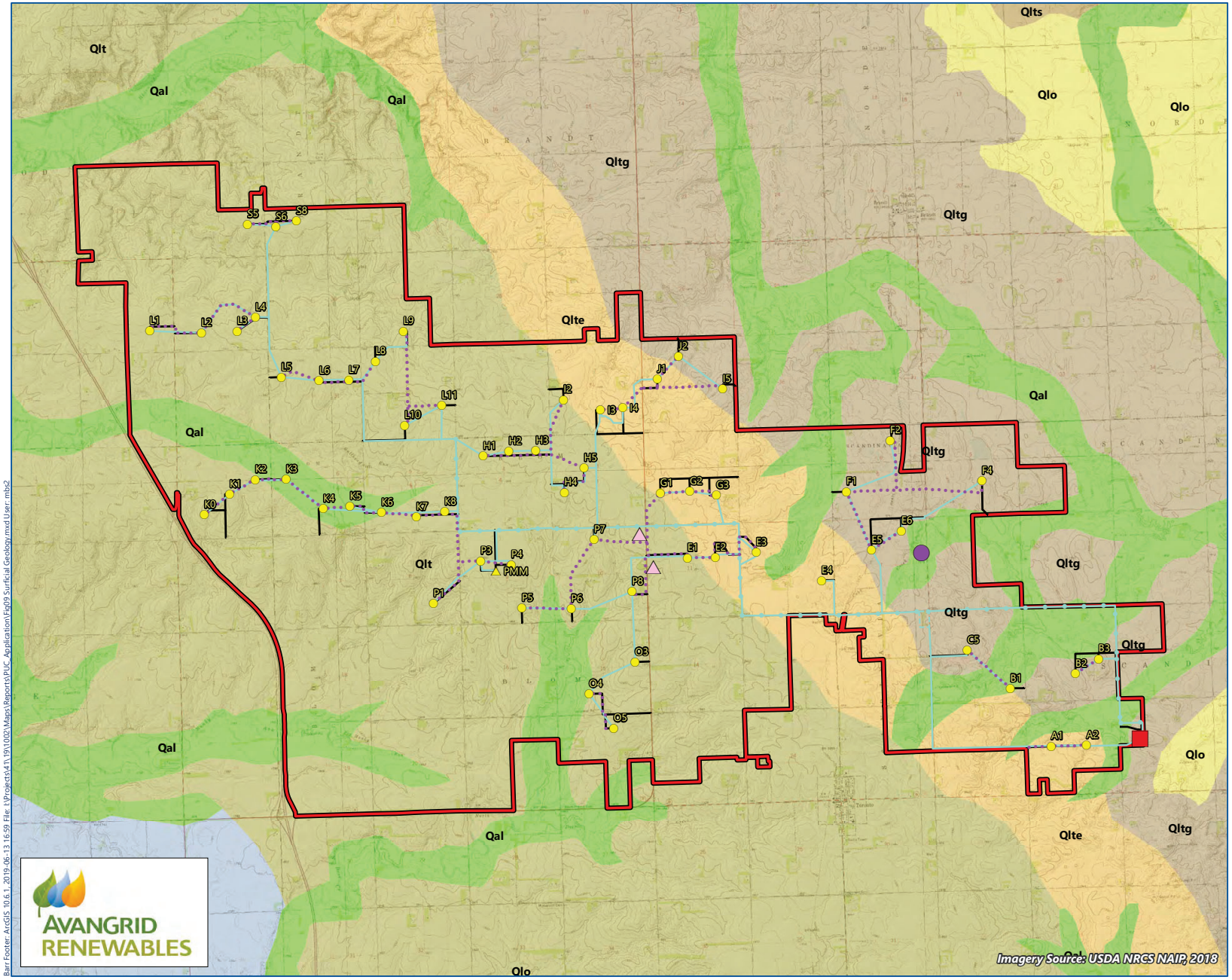
Barr.Foster: ArcGIS 10.6.1 | 2019-06-13 16:57 File: I:\Projects\411\191002\Maps\Reports\PUC_Application\Fig07d_Turbine_Siting_Ordinance_Constraints_Review - Water SE.mxd User: mbr2



Barr Footer: ArcGIS 10.6.1, 2019-06-13 16:58 File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig08 Location of Other Wind Energy Systems in the General Area.mxd User: mbs2

Figure 8

LOCATION OF OTHER WIND ENERGY SYSTEM IN THE GENERAL AREA
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota



- Turbine Location
- Met Tower Location
- Proposed Laydown
- Proposed O&M
- Proposed Substation
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Final Alignment To Be Determined
- Project Boundary

Surficial Geology

Quaternary

- Qal - Alluvium

Upper Wisconsin

- Qlo - Outwash, Undifferentiated
- Qltg - Till, Ground Moraine
- Qlts - Till, Stagnation Moraine
- Qlte - Till, End Moraine
- Qlt - Till, Moraine

Illinoian

- Qit - Till, moraine

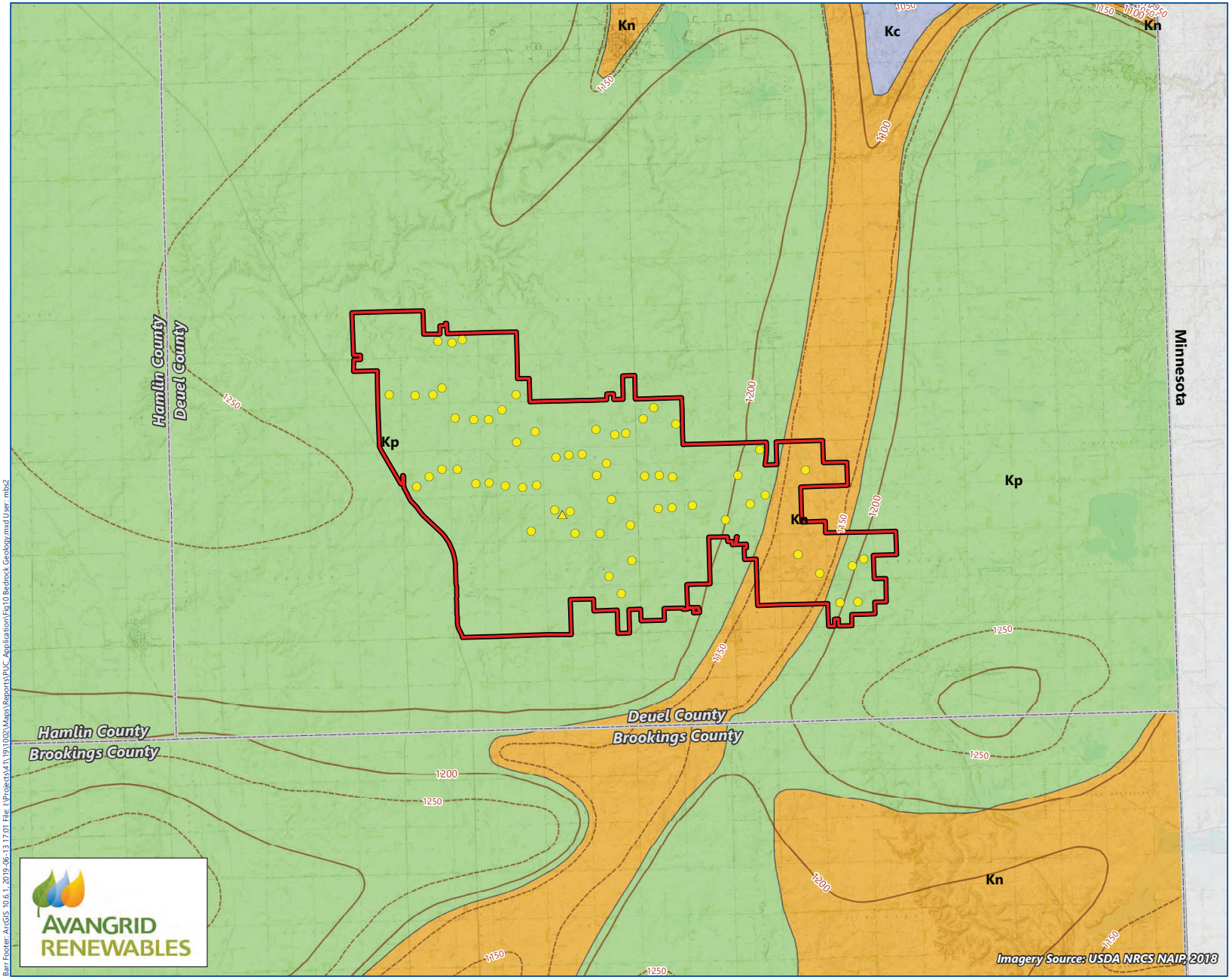
Stoeser, Douglas B. et al. Preliminary Integrated Geologic Map Databases for the United States - South Dakota. US Geological Survey. Open File Report 2005-1351. 2005.

Miles
1 0 1
Kilometers
1.5 0 1.5

Figure 9

SURFICIAL GEOLOGY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-06-13 16:59 File: V:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig09 Surficial Geology.mxd User: mb2



- Turbine Location
- Met Tower Location
- Project Boundary
- County Boundary

Bedrock Elevation Contour

- 50 Foot Contour
- 100 Foot Contour

Bedrock Geology

Upper Cretaceous

Kp - Pierre Shale. Blue-gray to dark-gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, and light-brown chalky shale.

Kn - Niobrara Formation. White to dark-gray argillaceous chalk, marl, and shale. Weathers yellow to orange. Contains thin, laterally continuous bentonite beds, chalky carbonaceous shale, minor sand, and small concretions

Kc - Carlile Shale. Dark-gray to black, silty to sandy shale with several zones of septarian, fossiliferous, carbonate concretions. Contains up to three sandstone units in the upper portion of the formation.

Data Source:
Tomhave, Dennis W. and Schulz, Layne D. Map Showing Configuration of the Bedrock Surface in South Dakota East of the Missouri River. South Dakota Geological Survey. 2004.

Miles
2 0 2

Kilometers
3 0 3

Figure 10

BEDROCK GEOLOGY
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-06-13 17:01 File: I:\Projects\41\191002\Maps\Reports\PUC_Application\Fig10 Bedrock Geology.mxd User: mbc2

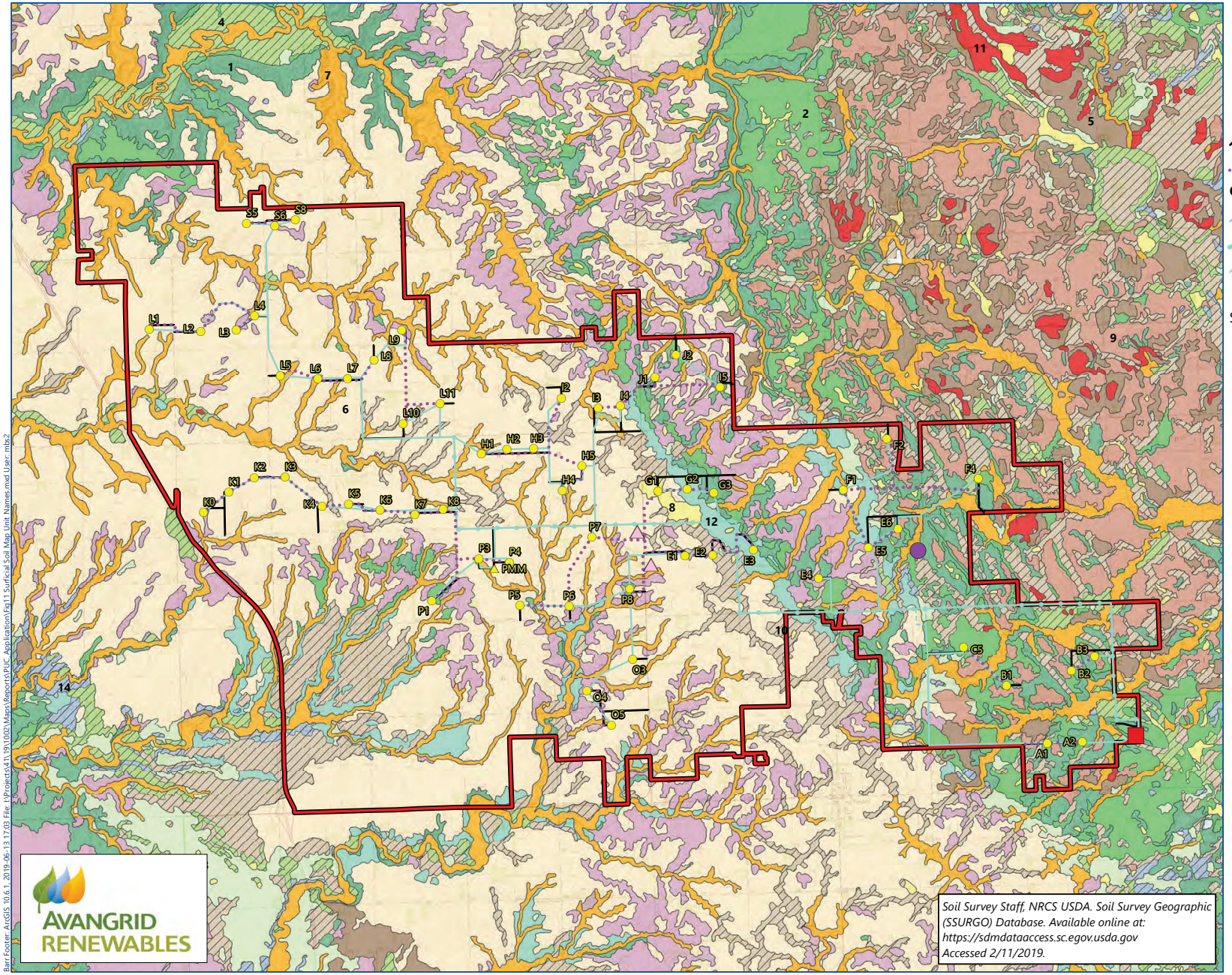
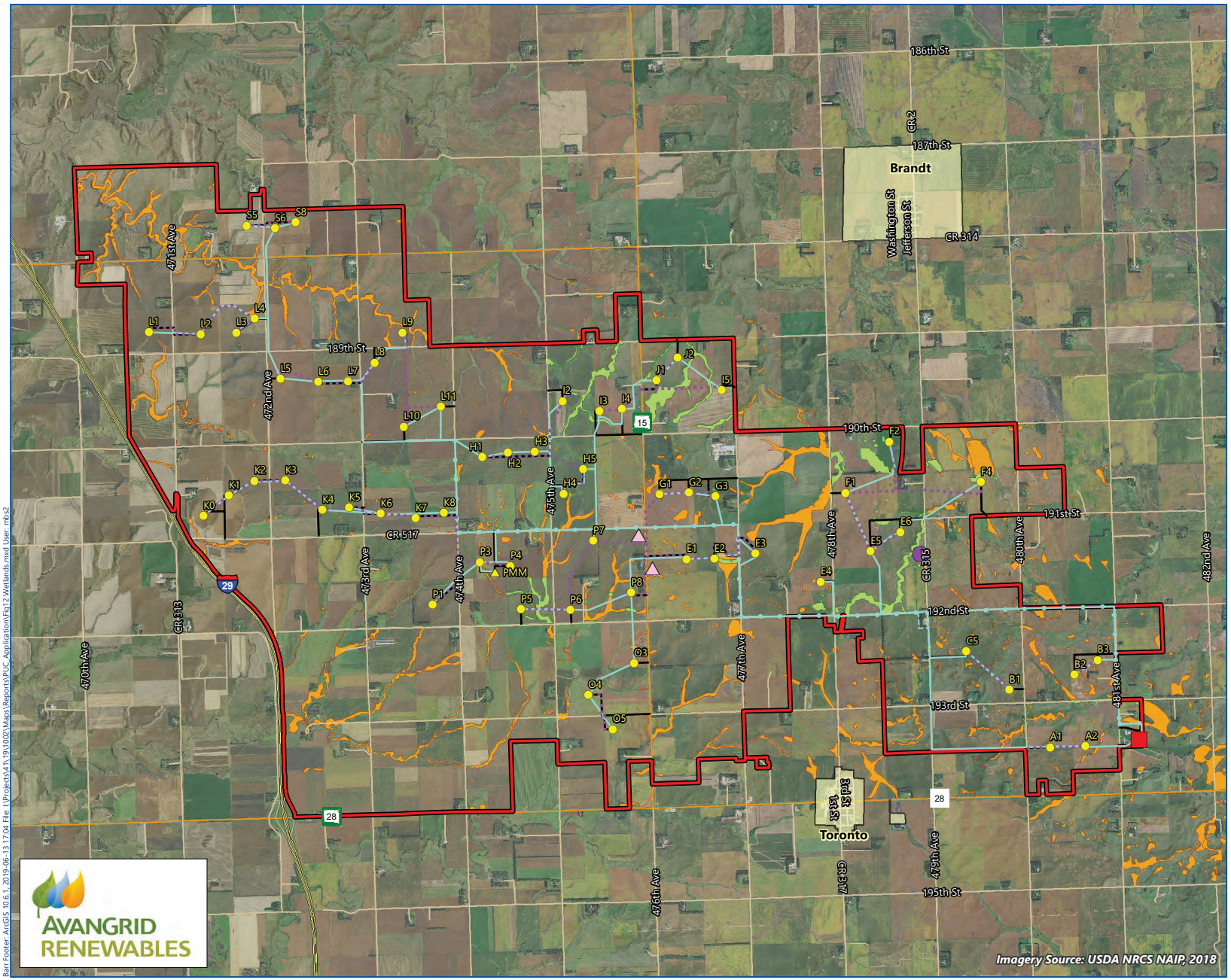


Figure 11

SURFICIAL SOIL MAP UNIT NAMES
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Foster ArcGIS 10.6.1, 2019-06-13 17:03 File: K:\Projects\411.19\1002\Maps\Reports\PUC Application\Fig11 Surficial Soil Map Unit Names.mxd User: mbs2



Turbine Location
Met Tower Location
Proposed Laydown
Proposed O&M
Proposed Substation
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground
Final Alignment To Be Determined
Freshwater Emergent (PEM) Wetland (Field-Delineated Data)
Potential Aquatic Resource (Desktop-Level Data)
Project Boundary
Municipality

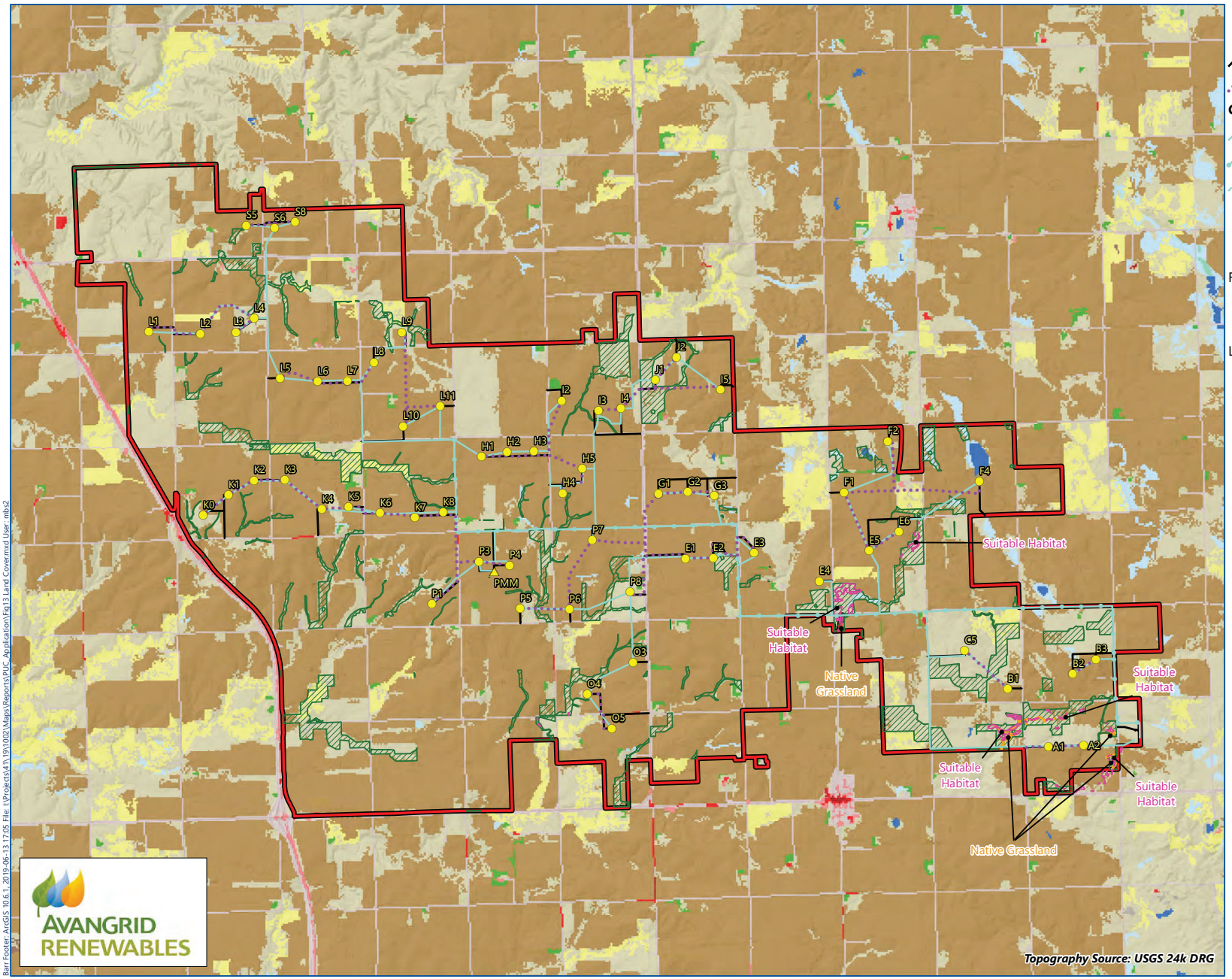
Miles
1 0 1

Kilometers
1.5 0 1.5

Figure 12

WETLANDS
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Foster ArcGIS 10.6.1, 2019-06-13 17:04 File: I:\Projects\41\19\1002\Maps\Reports\PUC_Application\Fig12_Wetlands.mxd User: mbs2



Turbine Location
Met Tower Location
Access Road
Crane Path

Collector Line

Underground
Overhead/Underground
Final Alignment To Be Determined
Project Boundary
Unoccupied Suitable Habitat for Dakota Skipper/Poweshiek Skipperling (Surveyed)

Field-Surveyed Undisturbed Grasslands

Native Grassland
Non-Native Grassland

Land Cover (USGS NLCD, 2011)

Woody Wetlands
Shrub/Scrub
Open Water
Herbaceuous
Hay/Pasture
Emergent Herbaceous Wetlands
Developed, Open Space
Developed, Medium Intensity
Developed, Low Intensity
Developed, High Intensity
Deciduous Forest
Cultivated Crops
Barren Land

USGS NLCD, 2011; Homer et al., 2015

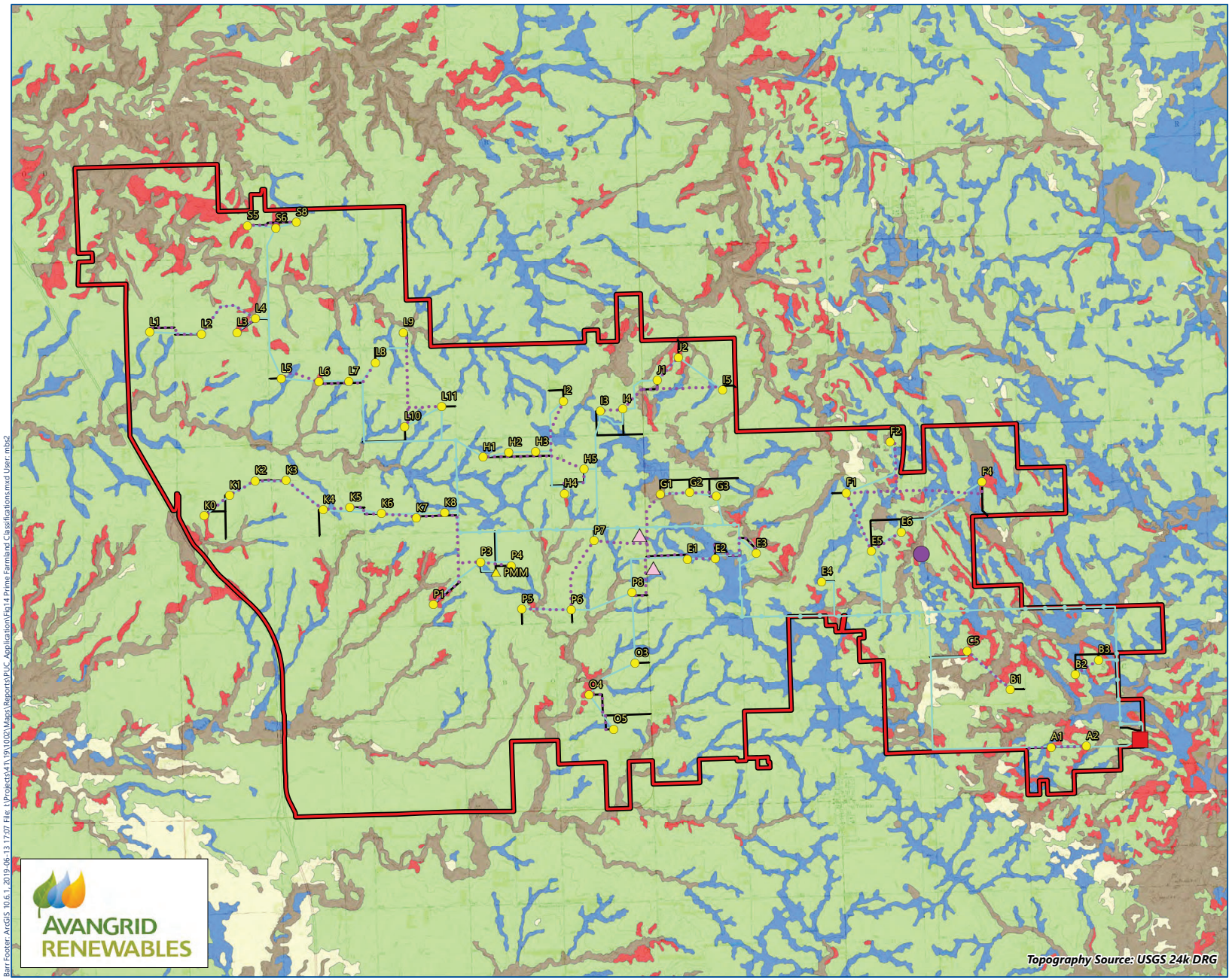
1 0 1 Miles

1.5 0 1.5 Kilometers

Figure 13

LAND COVER
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr Footer: ArcGIS 10.6.1, 2019-06-13 17:05 File: V:\Projects\415\191002\Maps\Reports\PUC_Application\Fig13 Land Cover.mxd User: mb-s2



- Turbine Location
- Met Tower Location
- Proposed Laydown
- Proposed O&M
- Proposed Substation
- Access Road
- Crane Path

Collector Line

- Underground
- Overhead/Underground
- Final Alignment To Be Determined
- Project Boundary
- County Boundary

Soil Farmland Classification

- Not prime farmland
- Prime farmland if irrigated
- Prime farmland if drained
- All areas are prime farmland
- Farmland of statewide importance

Soil Survey Staff, NRCS USDA. Soil Survey Geographic (SSURGO) Database. Available online at: https://sdmdataaccess.sc.egov.usda.gov Accessed 2/11/2019.

Miles
1 0 1

Kilometers
1.5 0 1.5

Figure 14

PRIME FARMLAND CLASSIFICATIONS
Tatanka Ridge Wind Project
Tatanka Ridge Wind, LLC
Deuel County, South Dakota

Barr.Foster ArcGIS 10.6.1, 2019-06-13 17:07 File: K:\Projects\41\191002\Maps\Reports\PUC_Application\Fig14 Prime Farmland Classifications.mxd User: mbs2

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TATANKA RIDGE WIND, LLC, FOR A PERMIT FOR A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH DAKOTA, FOR TATANKA RIDGE WIND PROJECT

SD PUC DOCKET EL _____

PREFILED DIRECT TESTIMONY OF MARK BASTASCH,

JACOBS

ON BEHALF OF TATANKA RIDGE WIND, LLC

June 17, 2019

TABLE OF CONTENTS

I. Witness Introduction 3

II. Shadow Flicker 4

III. Sound 5

I. Witness Introduction

Please state your name, employer, and business address for the record.

A. Mark Bastasch, Jacobs Engineering Group, Inc., 2020 SW 4th Avenue, Portland, Oregon, 97201

Q. Briefly describe your educational background.

A. I received my Bachelor's of Science degree (Cum Laude) in Environmental Engineering from California Polytechnic State University, San Luis Obispo, and my Master's of Science degree in Environmental Engineering from Rice University.

Q. Briefly describe your professional experience.

A. I routinely work with multidisciplinary teams that design, permit, and build infrastructure projects. My wind energy permitting experience dates back to the early 2000s when the first utility-scale wind projects were being developed, including the Stateline Wind Project, which at the time of permitting was among the largest wind projects in world. I am a registered Professional Engineer (P.E.) in the State of Oregon, having passed the Acoustical, Civil, and Environmental exams. Oregon is the only state to offer a P.E. in Acoustics.

Q. Have you attached a resume or CV.

A. Yes, my resume is attached.

Q. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

A. No, I have not.

Q. What is the purpose of your direct testimony?

A. The purpose of my direct testimony is to discuss the modeling the Tatanka Ridge Wind Project (Project) used to predict the duration of shadow flicker as well as the level of sound

during Project construction and operation.

Q. Which sections of the application are you responsible for?

A. I am responsible for Section 11.5, Acoustics and Appendix N, Acoustical Analysis, as well as Section 11.6, Shadow Flicker, and Appendix O, Shadow Flicker Modeling.

II. Shadow Flicker

What is shadow flicker?

A. When wind turbine blades rotate, the sun can cast moving shadows. These moving shadows are called shadow flicker.

Q. Is shadow flicker regulated at the local level?

A. Yes. 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."

Q. Will the project meet Deuel County's shadow flicker ordinance?

A. Yes. The duration of shadow flicker from the Project was predicted using the WindPro software package. The analysis was based on 62 wind turbine locations while only 56 locations will be constructed. The model calculated the annual hours of shadow flicker for the realistic expected case that considers sunshine and wind statistics. The results are presented in Appendix O, Shadow Flicker Modeling, and summarized in Table 11-8. The results demonstrate compliance with the local ordinance.

Q. If necessary, what mitigation measures will the project implement for project area residents?

A. While not expected to be necessary, multiple options are available to Tatanka Ridge Wind, including but not limited to investigating the nature of the concern, potentially providing the affected homeowner with technical and financial assistance to install awnings or window

coverings for windows on the sides of their residences that would be exposed to flicker; and providing residents with technical and financial assistance to install trees or shrubs that are strategically located to reduce shadow flickering around their residences. In cases where there is potential for shadow flicker effects to exceed adopted standards and where window coverings and landscape plantings would not be sufficient to reduce the shadow flicker effects to levels that are consistent with the standards, consideration can be given to programming specific turbines to modify their operation during sunny and windy conditions during the days and times turbines would be expected to create higher levels of shadow flicker.

III. Sound

Is sound regulated at the local level?

A. Yes. Deuel County's Zoning Ordinance Section 1215.03(13)(a) states, "Noise level shall not exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing residences, for non-participating residences."

Q. Will the project meet Deuel County's noise ordinance?

A. Yes. Acoustical modeling of the Project was conducted and is summarized in Section 11.5 and included in Appendix N, Acoustical Analysis, of the application. The acoustical model was developed based on International Organization for Standardization (ISO) Standard 9613-2 "Attenuation of Sound during Propagation Outdoors" as implemented in the Cadna/A software. The highest predicted sound level at a nonparticipating parcel is 44 dBA while 49 dBA is predicted at a participating parcel. These results comply with the Deuel County requirements, which establish a limit of 45 dBA at nonparticipant parcels. When less conservative modeling techniques are utilized, 41 dBA is the highest level predicted at a nonparticipant parcel while 47 dBA is predicted at a participant parcel.

Q. Are there acoustical emissions from construction?

A. Construction activities do result in the generation of sound or noise. Construction is a dynamic activity that moves from one area to another as construction progresses. The level of sound will depend on the nature of the activities and the distance from which they are observed. Estimated sound levels from construction are presented in Section 11.5 and Appendix N of the application. It is anticipated that noisy construction activities will primarily occur during daytime hours, though some limited critical activities may periodically carry over into the nighttime hours (for example, critical continuous concrete pours or critical lifts that require calm wind conditions).

Q. Will the project undertake efforts to mitigate concerns from construction sound?

A. While sound from construction activities is not regulated, the Project anticipates investigating construction noise complaints and working with the Project construction liaison in the event a specific issue arises.

Q. Are there mitigation measures to implement in either the construction or operation of the project?

A. Tatanka Ridge Wind does not anticipate needing sound mitigation. Tatanka Ridge Wind will require contractors to implement best management practices such as maintaining equipment in good working order in accordance with manufacturer specifications (for example, manufacturers recommend mufflers and silencers are functioning); enforcing speed limits for vehicles and construction equipment traveling within and around the Project area; and working with the Project liaison to address specific concerns that may arise.

/s/

Dated this 17 day of June 2019.

/s/

Mark Bastasch

Mark Bastasch, P.E., INCE

PRINCIPAL ACOUSTICAL ENGINEER

EDUCATION/QUALIFICATIONS

M.S., Environmental Engineering, William Marsh Rice University, Houston, Texas, 1997

B.S. (*cum laude*), Environmental Engineering, Cal Poly, San Luis Obispo, California, 1994

PROFESSIONAL REGISTRATIONS

Professional Acoustical Engineer: Oregon (No. 58990AC)

Professional Environmental Engineer: Oregon (No. 58990EN)

Professional Civil Engineer: Oregon, (No. 58990PE)

MEMBERSHIPS AND AFFILIATIONS

Member, Institute of Noise Control Engineering (INCE)

Member, Acoustical Society of America

Organizer, INCE-E Wind Turbine Noise Conference Series

AWARDS/HONORS

2010 CEO Excellence Team Award Winner

2016 CEO Excellence Career Achievement Award Nominee

2018 Joseph J. Jacobs Master Builder Award Project Team Member

Mr. Bastasch has more than 20 years of experience conducting acoustical evaluations and working with multimedia environmental permitting and design teams. For over a decade, Mr. Bastasch has provided technical leadership on acoustical matters related to renewable energy facilities. He has been an invited speaker to organizations such as Harvard Law School's Consensus Building Institute, the U.S. Department of Energy's (USDOE) Wind Powering America, the International Energy Agency/USDOE National Renewable Energy Laboratory, National Wind Coordinating Council, Law Seminars International, Midwest Energy Bar Association, American Wind Energy Association, and USDOE's New England Wind Energy Education Project; and he has served as plenary speaker or session chair at conferences in Australia, Japan, Italy, and England. Mr. Bastasch has acoustical permitting and design experience in the U.S. power and infrastructure sectors and he has supported multiple design and engineer, procure, construct (EPC) efforts both domestically and internationally, each of which has fully complied with applicable regulatory limits. He served as lead acoustical consultant on Australia's largest coal seam, gas-fueled, air-cooled, combined-cycle power plant and on Power Engineering's Best Gas-fired Project for 2013 (the Empire Generating Project in Rensselaer, New York).

Mr. Bastasch's work on wind energy has been cited by officials from Oregon to Maine. He provided acoustical expertise on the first major wind projects in Oregon, including the Stateline facility, which when permitted in the early 2000s was the largest wind project in the world. Mr. Bastasch was also acknowledged by the Oregon Health Authority for providing technical input to their "Strategic Health Impact Assessment on Oregon Wind Energy Developments."

Areas of Expertise

- Specializes in industrial noise measurements, modeling, and control for power, industrial, and transportation clients.
- Has prepared acoustical analyses or expert testimony for more than 15,000 megawatts (MW) from gas-fired power facilities and more than 5,000 MW from wind generation facilities.
- Appointed by Oregon State Board of Examiners for Engineering and Land Surveyors to develop and grade the Professional Engineering (P.E.) exam in Acoustics. Oregon was the only state to issue a P.E. in acoustics.
- Experienced in analyzing noise levels for no-build and build alternatives; supporting feasibility, design, and siting analyses of industrial, high-tech, and data center facilities; and preparing noise and vibration impact assessment reports.
- Has served as an acoustical technical lead for numerous transportation projects in Alaska, California, Colorado, Oregon, Washington, and Idaho; tasks include monitoring, modeling, and mitigation recommendations in accordance with applicable state laws.

Mark Bastasch, P.E., INCE
PRINCIPAL ACOUSTICAL ENGINEER

- Has conducted numerous noise studies in conjunction with National Environmental Policy Act (NEPA) documents and the energy facility siting requirements of various states.

Representative Project Experience

Wind and Solar Energy Projects

Lead Acoustical Engineer; South Fork Wind Farm; Deepwater Wind; Offshore Massachusetts, Rhode Island, and New York. Subject matter expert on noise evaluations and documentation. Conducted senior technical review of noise-related impact analysis focusing on in-air noise from the proposed construction and operation activities.

Lead Acoustical Engineer; Stateline Wind Project; Oregon and Washington. Led acoustical analysis for a 263-MW wind farm and prepared environmental documentation to comply with both Oregon and Washington standards. At the time of permitting, this was the largest wind project in the world.

Lead Acoustical Engineer; Biglow Canyon Wind Farm; Orion Renewable Energy and Portland General Electric; Oregon. Provided acoustical analysis and regulatory assistance to support the permitting and construction of the Biglow facilities. Efforts included monitoring, modeling, regulatory review, and preparation of compliance filings.

Lead Acoustical Engineer; Massachusetts Military Reservation, United States Air Force. Prepared acoustical analysis to support NEPA environmental assessments (EAs) for the addition of on-base wind turbines.

Lead Acoustical Engineer; High Plains Wind Project, Seven Mile Hill Wind Project, and Glenrock Wind Project; Wyoming. Prepared technical noise analysis for submittal in support of the Industrial Development Information permitting process. Developed noise models and contours to assess potential acoustical compliance with multiple turbine types and layouts.

Lead Acoustical Engineer; Kittitas Valley Wind Project; Washington. Led the successful filing of an acoustical analysis for the Washington Energy Facility Siting Evaluation Council (EFSEC) for a 121-turbine wind energy project. This was the first time Washington's EFSEC siting process had been used for a wind project. Provided expert testimony at state and local level. Project permit was upheld by State of Washington's highest court.

Lead Acoustical Engineer; Wild Horse Wind Project; Washington. Led environmental and engineering noise studies to support a 158-wind-turbine project with an installed nameplate capacity of up to 312 MW and associated transmission, substation, roads, and operation and maintenance facility.

Lead Acoustical Engineer; Palouse Wind Project; First Wind; Washington. Prepared acoustical analysis in support of State Environmental Policy Act Environmental Impact Statement (EIS) and Conditional Use Permit application efforts for this 100-MW project in Whitman County. Tasks included public meeting attendance, preparing expert witness testimony, and supporting public hearing.

Mark Bastasch, P.E., INCE
PRINCIPAL ACOUSTICAL ENGINEER

Lead Acoustical Engineer; Lower Snake River Wind Project; RES Americas and Puget Sound Energy; Washington. Prepared permitting analysis, expert reporting, and testimony to support the permitting of this 1,400-MW wind farm. Tasks included supporting extensive public outreach at various open house and other forums as well as responding to multiple acoustical comments from the public and agencies during the permitting process. The second phase of this project was recently constructed and is now owned by Portland General Electric.

Lead Acoustical Engineer; Boardman Solar Energy Facility; Invenergy, Oregon. Prepared acoustical analysis for the 800-acre Boardman Solar Energy Facility, which is a 75-MW, photovoltaic solar energy generation facility. Authored Exhibit X, Noise, for the facility's Application for Site Certificate to the Oregon Energy Facility Siting Council. Responded to agency information request. The Site Certificate was issued for the facility in February 2018.

Acoustical Engineer, Carty Generating Station and Carty Solar; Portland General Electric; Boardman, Oregon. Responsible for developing the acoustical analysis to support Exhibit X for the proposed expansion of the Carty Generating Station and Carty Solar, a 50-MW photovoltaic project.

Power Plants

Lead Acoustical Engineer; Application for Certification; Alamitos Energy Center; AES Southland Development LLC; California. Authored acoustical analysis for a 1,040-MW repower of the existing Alamitos Beach Generating Station located within the coastal zone of Long Beach, California. Tasks included ambient monitoring, acoustical modeling of operational and construction noise, regulatory evaluation, and participation in California Energy Commission (CEC) workshops. The CEC issued the final decision for the project in May 2017.

Lead Acoustical Engineer; Application for Certification; Huntington Beach Energy Project; AES Southland Development LLC; California. Authored acoustical analysis for an 840-MW repower of the existing Huntington Beach Generating Station located within the coastal zone of Huntington Beach, California. Tasks included operational monitoring, acoustical modeling of operational and construction noise, regulatory evaluation and participation in CEC workshops. Mobilized team to provide expert testimony on potential impacts of sound levels on sensitive species. The CEC issued the final decision for the project in May 2017.

Acoustical Engineer; Empire Generating Project; Rensselaer, New York. Comprehensive acoustical analysis, design, specification and compliance assessment of the new 535-MW combined-cycle Empire Generating Plant engineered and constructed by CH2M HILL. The project, formerly known as BESI Corp., was named the Best Gas-Fired Project by Power Engineering in 2013. The project underwent extensive permitting under New York's Article X, which required detailed analysis during the bid, design, construction, and compliance phases.

Acoustical Engineer; Port Westward Generating Project (1 and 2); Portland General Electric; Oregon. Comprehensive acoustical permitting and compliance assessment of a new 425-MW combined-

Mark Bastasch, P.E., INCE
PRINCIPAL ACOUSTICAL ENGINEER

cycle facility and subsequent amendment for 200-MW additional peaking capacity. Provided owners acoustical engineering services in support of the Port Westward combined-cycle facility and peaking facility. Project experience included facility noise modeling and operational compliance assessment for submittal to the Oregon Energy Facility Siting Council. After the successful operation of the combined-cycle facility, multiple options for peaking options were evaluated. Developed acoustical mitigation in consultation with OEMs and PGE to satisfy overall facility permitting requirements.

Lead Acoustical Engineer; Licensing and Permitting for San Francisco Electric Reliability Project (SFERP); San Francisco Public Utilities Commission. Led acoustical tasks to develop a 145-MW simple-cycle plant in southeast San Francisco, using three LM 6000 turbines.

Lead Acoustical Engineer; Hermiston Power Project, Calpine Corporation, Hermiston, Oregon. Conducted acoustical and vibration monitoring to determine if steam turbine generator, heat recovery steam generators, stacks, and combustion turbine generators complied with warranted levels within a time critical schedule. Prepared detailed environmental noise monitoring to demonstrate that the facility complied with permit conditions and minimized the time full load operation was needed during off-peak hours. Oregon Department of Energy accepted the report without comment.

Lead Acoustical Engineer; Walnut Energy Center; Turlock Irrigation District; Turlock, California. Led acoustical tasks for a combined-cycle power plant, which included developing detailed noise model; comparing expected noise levels with the city of Turlock, County of Stanislaus, and the CEC's noise guidelines; preparing Application for Certification and subsequent amendments submitted to the CEC.

Lead Acoustical Engineer; MEGS; Modesto Irrigation District; Ripon, California. Led acoustics for a LM6000 (Norway package) power plant. Tasks included coordinating measurements of operating Norway Package with General Electric; developing detailed noise model; comparing expected noise levels with the City of Ripon, County of Stanislaus, and CEC noise guidelines; preparing Application for Certification and subsequent amendments submitted to the CEC; and review of Conditions of Certification, testimony at CEC evidentiary hearings.

Lead Acoustical Engineer; Humboldt Bay Repowering Project; Pacific Gas & Electric; Humboldt, California. Prepared application for certification to the CEC. Facility is a load-following power plant consisting of 10 natural gas-fired Wärtsilä 18V50DF 16.3-MW reciprocating engine-generator sets and associated equipment with a combined nominal generating capacity of 163 MW. Developed and executed operational compliance monitoring strategy. Compliance assessment was accepted by the CEC without comment.

Mark Bastasch, P.E., INCE
PRINCIPAL ACOUSTICAL ENGINEER

Transportation

Lead Acoustical Engineer; Interstate 5 Delta Park to Lombard; Oregon Department of Transportation; Portland, Oregon. Prepared noise analysis, technical report, and input for the EA/EIR as well as final noise wall design for this heavily traveled section of interstate highway.

Lead Acoustical Engineer; Reconstruction of Hyampom Road; Shasta Trinity National Forest; Trinity County, California. Prepared noise analysis, technical report, and input for the EA/EIR for the Federal Highway Administration Central Federal Lands Highway Division. Analysis cost and timeline was reduced by performing a desktop analysis given remote project site, low traffic volumes, and few residential receptors.

Lead Acoustical Engineer; Idaho 16, I-84 to SH-44 Environmental Study; Idaho Transportation Department. Led noise review on this highly visible project with a 3-year accelerated schedule studying a new 6.5-mile route connecting I-84 to SH-44. The project encompasses a river crossing and connections across the valley with impacts to farmlands, residential subdivisions, wetlands, and commercial areas.

Task Manager; Huffman Road Reconstruction Project Noise Studies and Mitigation Design; Alaska Department of Transportation and Public Facilities. Prepared preliminary noise analysis for noise measurements collected at seven locations in the project area. Estimated future build noise levels and developed preliminary mitigation measures in accordance with the Alaska Department of Transportation and Public Facilities.

Noise Analysis for Various Sectors

Acoustical Engineer, General Dynamics Electric Boat Project, Groton, Connecticut. Prepared acoustical analysis to support the design and permitting of an additional manufacturing facility for construction of the new Columbia class of submarines. Analysis was reviewed by the Authority Having Jurisdiction (AHJ) as well as their acoustical consultant and no changes were requested. Project was approved.

Acoustical Engineer, Boardman to Hemingway Transmission Line Project, Idaho Power, Oregon. Responsible for preparing an updated acoustical analysis of this 500-kV transmission line between Boardman, Oregon and Melba, Idaho. Provided senior review for Exhibit AA (EMF) and DD (Induced Currents) and facilitate appropriate level of acoustical discussion in other exhibits.

Acoustic Lead, Embarcadero-Potrero 230 kV Transmission Project. PG&E, San Francisco County, California. Acoustical technical lead for the development and filing of the Proponent's Environmental Assessment (PEA) for a new 3.5-mile 230-kV underground and submarine cable. This critical infrastructure project is designed to maintain power to San Francisco under a major seismic event scenario.

Lead Acoustical Engineer; Oregon LNG Bidirectional Terminal and Pipeline Project, Oregon. Acoustical engineering lead supporting permitting and preparation of numerous applications to federal, state, and local permitting agencies. The project consists of a liquefied natural gas

Mark Bastasch, P.E., INCE
PRINCIPAL ACOUSTICAL ENGINEER

(LNG) terminal with a base load liquefaction capacity of 9.6 million metric tons per year requiring and a base load regasification capacity of 0.5 Bscf/d. The terminal included a slip and berth for loading and offloading LNG carriers, and onshore facilities consisting of natural gas pretreatment, natural gas liquefaction, LNG vaporization, LNG storage, and associated support facilities. Prepared the requisite environmental resource reports in support of the project application to the Federal Energy Regulatory Commission as well as acoustical analysis in support of the biological assessment of marine and terrestrial species submitted to National Marine Fisheries Service and U.S. Fish and Wildlife Service.

Lead Acoustical Engineer; Tacoma LNG Project; Puget Sound Energy; Pierce County, Washington. Responsible for supporting acoustical permitting aspects related to the construction and operation of an LNG fueling facility to serve various industries in the Pacific Northwest. The proposed project includes the LNG fueling facility on approximately 36 acres and numerous improvements to an existing natural gas distribution system throughout Pierce County, Washington. Tasks included supporting a Supplemental Environmental Impact Statement in compliance with the Washington State Environmental Policy Act.

Acoustical Engineer; Water Storage Reservoir; Windsor, California. Prepared acoustical analysis of the construction and operation of the reservoir to support the supplemental environmental impact report for CEQA compliance. Also developed responses to comments received during the permitting process. Project involved comprehensive preliminary engineering and environmental services for a new water storage reservoir to provide seasonal storage needed by the Town's recycled water system.

Acoustical Task Leader; Tehachapi Transmission Line; Southern California Edison; California. Prepared acoustical analysis to support regulatory permitting requirements. This multimillion-dollar proponent's environmental assessment (PEA) included preparation of and support activities for a PEA submitted to the California Public Utilities Commission for an approximate 170-mile transmission line and substation project on federal, state, and private property.

Acoustical Task Lead; Odessa Environmental Impact Statement; Eastern Washington. Prepared acoustical analysis to support regulatory permitting requirements. Tasks included modeling and preparing required environmental documentation. The EIS evaluated alternatives to deliver surface water from the Columbia Basin Project to irrigated lands that currently rely on a declining groundwater supply from the Odessa Groundwater Management Subarea in eastern Washington.

Representative Publications and Presentations

Moderator, Conference Organizer, and Instructor for "Introduction to Acoustics" at INCE-Europe Wind Turbine Noise 2017. Rotterdam, Netherlands. May 2017.

Plenary Speaker. Acoustics 2016. "Wind Turbine Sound: Past, Present and Future." Brisbane, Australia. November 2016.

Mark Bastasch, P.E., INCE
PRINCIPAL ACOUSTICAL ENGINEER

"Glad to Hear It! A Brief Update on Wind Turbine Sound." Canadian Wind Energy Association Annual Conference. Calgary, Alberta. November 2016.

"Glad to Hear It! Wind Turbine Sound." American Wind Energy Association Wind Power Project Siting and Environmental Compliance Conference and Wind Power Conference. March and May 2016.

Wind Turbine Noise Topic Organizer. InterNoise 2014. Melbourne, Australia. November 2014.

Plenary Speaker. INCE-USA Noise-Con 2013. Denver, Colorado. August 28, 2013.

Instructor: "Introduction to Acoustics." INCE-Europe Wind Turbine Noise 2013. Denver, Colorado. August 27, 2013.

"Criteria." Wind Turbine Noise. Bowdler & Leventhall, editors. Multi-Science Publishing Co. Ltd. ISBN 978-1-907132-30-8. January 2012.

"AWEA/CanWEA Expert Sound Panel and Wind Turbine Sound Regulations." University of Tokyo, Tokyo, Japan. September 12, 2011.

"Wind Turbine Sound." Consensus Building Institute Workshop of Facilitating Wind Energy Siting, Harvard Law School, Cambridge, MA. March 23-25, 2011.

"Wind Turbine Sound and Health – An Expert Panel Review." American Wind Energy Association, Windpower 2010. Dallas, TX, May 24-27, 2011.

"Wind Turbine Noise." American Wind Energy Association Wind Power Project Siting Workshop, Milwaukee, WI. February 28 – March 2, 2007.

"Wind Turbine Noise – An Overview." Mark Bastasch, Jeroen van Dam, Bo Søndergaard, and Anthony Rogers. *Journal of the Canadian Acoustical Association*. June 2006. Vol. 34 No. 2.

"Wind Turbine Generator Noise Prediction - Comparison of Computer Models." Tickell, C. E., J. T. Ellis, and M. Bastasch. Proceedings of ACOUSTICS 2004, 3-5 November 2004, Gold Coast, Australia.

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TATANKA RIDGE WIND, LLC. FOR A PERMIT FOR A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH DAKOTA, FOR TATANKA RIDGE WIND FARM

SD PUC DOCKET EL _____

PRE-FILED DIRECT TESTIMONY OF JESSE BERMEL

ON BEHALF OF TATANKA RIDGE WIND, LLC.

JUNE17, 2019

TABLE OF CONTENTS

I. Witness Introduction …….1

II. Purpose and Coverage of Testimony……3-4

Q. **Please state your name, employer and business address for the record.**

A. My name is Jesse Bermel and I am a Senior Project Developer with Avangrid Renewables, Inc., the owner of Tatanka Ridge Wind Project (Tatanka Ridge), LLC. My office location is 1125 NW Couch, Suite 700, Portland, OR 97209.

Q. **Briefly describe your educational background.**

A. I have a Bachelor of Science in Environmental Science from Iowa State University and pursuing a Master of Business Administration (MBA) from the University of Liverpool. I have 12 years of experience in renewable energy development, project entitlements/permitting, and environmental review. I have been involved in the successful development of multiple utility scale wind energy projects across the USA. My work involves the oversight and management of the development of the Tatanka Ridge Wind Project.

Q. **Briefly describe your professional experience.**

A. I have been employed in renewable energy development and operations for the past 12 years. Prior to the that time, I worked as a supervisor for an AmeriCorps program on Cape Cod, Massachusetts.

Q. **Have you attached a resume or CV.**

A. Yes, my resume is attached.

Q. **Have you previously submitted or prepared testimony in this proceeding in South Dakota?**

A. No, I have not.

Q. **What is the purpose of your direct testimony?**

A. My purpose is to support the application and to make commitments on behalf of the applicant where appropriate and necessary.

Q. Please give us an overview of your involvement in the proposed project?

A. I am currently the lead developer on the Tatanka Ridge Project. I took over the responsibilities in the fall of 2015. I have negotiated wind agreements with landowners, engaged the community with project updates, and have responsibility for permitting the project at the county and state level.

Q. Which sections of the application are you sponsoring with your testimony?

A. I'm responsible for all or portions of Sections 1-5, 15, 16.1, 16.2, 16.3, 16.4, 17, 18, and 21.

Q. Please provide an overview of the location of the project?

A. The Project is located entirely within Deuel County in the Townships of Scandinavia, Blom, Brandt, Hidewood, and Grange, approximately 4 miles west, northwest, north, north east, and east of Toronto, South Dakota. The Project will be located on mostly privately held land within a 27,900-acre Project Area.

Q. What is covered by the application submitted for the Tatanka Ridge Wind Project?

A. Tatanka Wind Project, LLC is submitting an application for approval of an Energy Facility Permit to construct and operate the Tatanka Ridge Wind Project from the South Dakota Public Utilities Commission. The total installed capacity of the Project is up to 155 megawatts (MW). The application includes the requested approval of 62 locations, of which 56 will be constructed. 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 and consultations with landowners.

Project components will include up to 50 GE 2.82 MW-127 wind turbine generators and 6 GE 2.3 MW 116, temporary/permanent access roads, 34.5 kilovolt (kV) underground/overhead electrical collector lines, project substation, interconnection substation, permanent met tower, and may include an O&M facility. Additional temporary construction areas, include crane paths, public road improvements, laydown yard/staging area and a concrete batch plant if needed. The Project will interconnect to the high-voltage transmission grid via the 345kV Astoria Substation from our 34.5kV collector substation.

Q. What is the purpose of the facility and why is it needed?

A. The purpose of the Project is to generate electricity via wind power to supply the needs required for contracts with Tatanka Ridge Tatanka Ridge 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. Recent analysis has consistently shown that wind energy is one of the most cost-effective electricity sources for customers, making it a desirable investment. New wind energy facilities are less expensive to construct than new conventional energy sources, even without the existing production tax credit program. This is demonstrated by the PPAs that have been executed for the Project.

Q. **What are the beneficial attributes of the project?**

A. 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.

Q. Please provide a description of the proposed decommissioning plan for Tatanka?

At present, the anticipated Project life is approximately 40 years beyond the date of initiating commercial operation. It is possible that the project could be continued past that date or retrofitted with upgrades. At the end of commercial operation, Tatanka will be responsible for removing wind facilities and the turbine foundations to a depth of four feet below grade.

In any event, at the end of commercial life, Tatanka will be responsible for all costs to decommission the Project and associated facilities. The net cost to decommission will depend upon the prevailing rates for salvage value of the equipment, and labor costs. Because of the

uncertainties surrounding future decommissioning costs and salvage values, Tatanka will review and update the cost estimate of decommissioning and restoration for the Project every five years after Project commissioning pursuant to State Law Requirements. Tatanka will comply with permit requirements, county ordinances and state law at the time of decommissioning.

At present, the net decommissioning cost (in 2018 US dollars) is estimated to be approximately $4.989 million dollars assuming salvage and no resale of Project components. This cost includes a partial offset from the salvage value of the towers, turbine components and electrical equipment. Tatanka proposes to cover the cost of the decommissioning through a parent guarantee or letter of credit.

Q. Do your agreements with landowners speak to decommissioning? If so, what do they say?

A. Our agreements provide 18 months after the life of the project to remove all above ground facilities, concrete removal to a depth of 4ft below the surface, and restore all surfaces to a condition equal or better than when we initially developed.

Q. Why was the Project location selected and what other alternative areas were considered?

A. Generally, a wind project location, or early prospect, is identified through a combination of identifying a high wind resource area based on publicly available data and access to transmission. From there, the land use considerations are factored in such as the environmental compatibility of a given area, current land uses, and land owner support. Avangrid and its predecessors have had substantial success in this area of South Dakota, as well. All of these factors were determined to be favorable based on the Tatanka area and thus the Project was

pursued for further development.

Q. Did you work with the County Agencies in coordinate with the CUP process and what efforts were made to address questions or concerns?

A. Yes. Deuel County had an existing wind energy development ordinance within the existing zoning ordinance that was a bit dated. County officials elected to update this ordinance in order to improve it and started the process in early 2016. I worked closely with the County to provide information and participate through the public process while the zoning ordinance update was being prepared. The County approved its zoning ordinance in October 2018. Avangrid was able to work with the county and design the project so that it was consistent with the requirements in the zoning ordinance.

We have many points of contact with the public to convey information about the Project, in particular during the public meetings to update the Deuel County Zoning Ordinance. In addition, there was an open house meeting regarding the Tatanka Wind Project. The open house occurred in June of 2018 while Deuel County was still updating their Zoning Ordinance.

On June 11, 2019, the Deuel County Board of Adjustment voted 5-0 in favor of granting a Wind Energy System and Special Exception permit to Tatanka Ridge.

Q. What is the proposed time schedule for the Project and what are the implications of a delay?

A. The Project is scheduled to be operational by late fall of 2020. We are hopeful to receive favorable determinations on the SDPUC facility permits by December of 2019. Current activities through the spring and summer of 2019 will include completion of an ALTA survey, supplemental environmental studies (as needed), geotechnical studies, and final engineering and

design.

A delay in the Project would result in several consequences. First, the project has existing PPAs that have been executed that have contractual commercial operation date requirements in them. If we are not able to meet these deadlines, liquated damages would be incurred or at worst, the PPA's could be cancelled if the Project cannot meet certain deadlines. Further the Production Tax Credit 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.

Q. Are you proposing to install an aircraft detection lighting system (ADLS)?

A. Tatanka Ridge is electing to use an aircraft detection lighting system (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.

Q. What is the estimated cost of the Tatanka Wind Farm Project?

A. We estimate the cost to be approximately $216,000,000.00.

Q. What will be the impacts upon the community expected from the project?

A. 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. A typical wind project results in an influx of millions of dollars into the local economy. Many local businesses will experience increased activity during this period.

Q. What payments will the project make?

A. The project will make payments to landowners before, during, and after construction.

Q. What will be the impacts to commercial, industrial, and agricultural sectors?

A. The area within and surrounding the project is primarily agricultural. The project will take a small amount of existing agricultural land out of crop and forage production. The project will compensate landowners for losses to crop production during construction. No further mitigation measures are necessary or proposed.

Q. What will be the expected impacts on community facilities and services?

A. Based on the short-term duration of construction activities, the project does not anticipate significant impacts to community facilities and services. The existing facilities should be sufficient to support any demand from the work force during construction and/or operation.

Q. Are mitigation measures proposed for community facilities and services?

A. The project will work with local emergency management agencies to develop procedures for response to emergencies, hazards, and potential incidents.

Q. Are there expected impacts to local transportation?

A. 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 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.

Q. Are mitigation measures proposed for ground transportation impacts?

A. Yes. 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.

Q. Are there aviation impacts expected?

A. There are no airports within or near the project boundary. The nearest airports appear to be just north of the city of Clear Lake approximately eight miles north of the project boundary.

Q. Are there expected impacts to aviation from the project?

A. There are no airports within or near the Project boundary. 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.

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.

Q. Are mitigation measures proposed for aviation impacts?

A. Yes. 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.

Q. What are the project employment estimates?

A. It's expected that construction of the project will create approximately 200 jobs over the estimated nine-month construction. It is further estimated that 12-15 permanent jobs will be created by the project.

Q. Are there future additions and modifications proposed?

A. No. 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.

Q. Will the project obtain all applicable permits for construction and operation?

A. Yes. See Table 22-1 in Section 22.1 of the application, which details the expected required permits and approvals for the project. In addition, Tatanka Ridge conducted agency consultation as detailed in Section 22.2 of the application.

Dated this 17 day of June 2019.

/s/

Jesse Bermel

930 Pheasant Ln, North Liberty IA 52317
Mobile: (503)724-2483
jbermel@avangrid.com
https://www.linkedin.com/in/jesse-bermel-92224013

Jesse Bermel

SUMMARY

Passionate developer of renewable energy power plants with twelve years of project management experience. Secured 200k acres in 4 states for new wind projects. Permitted and co-developed 4 wind projects in 4 states under budget. Managed up to 8 land agents in 4 different states with an annual budget of $1-$2M. Pursuing an MBA to further project management skillsets.

WORK EXPERIENCE

2019 – Present Ld/Sr Business Developer
North Liberty, IA Avangrid Renewables

Manage all Avangrid wind and solar projects in Western MISO, currently a $750M portfolio of mature, construction ready and early stage assets.

2015 – 2019 Career Business Developer
North Liberty, IA Avangrid Renewables

Manage a $700M constructible wind development pipeline with projects in the lifecycle stage of greenfield to fully permitted projects ready for construction

Coordinate with origination, permit projects, acquire land, and manage project budgets

Oversee land agents for critical land acquisition efforts

Present to universities, elected officials, landowners, community events, and conferences about Iberdrola and renewable energy in the country

2008 – 2014 Associate Business Developer
Chicago, IL Iberdrola Renewables

Developed a wind pipeline of 850MW

Continued

SKILLS

Personal
Results
Contract negotiation
Public speaking
Continuos improvement
Goal oriented
Adaptable to many hats
Motivate others
Team player

Memberships
AWEA
SEIA
WOW
IWEA
SDWEA

Computer
Microsoft Office
Apple
SAP

Continued Learning
MISO
PJM
ROW
Project Management
Bob Boylan Training

INTERESTS

Golf
College Football
College Basketball
Ice Hockey
Volunteering
Biking
Smart Cities
Emerging Technology

Jesse Bermel
jessebermel@gmail.com

Secured over 20 miles of transmission easements

2008 – 2008 Generation Dispatcher, Ld/Sr
Portland, OR Iberdrola Renewables

Remotely monitored 18 operating wind power plants and trained new employees

2006 – 2008 Wind Technician, Wind Plant Monitoring
Portland, OR Iberdrola Renewables (formerly PPM Energy)

Communicated grid outages and power plant updates on a daily basis to CAISO, Real-Time, Scheduling, Asset Management, and Wind Operations

2005 – 2006 Supervisor, AmeriCorps
Barnstable, MA AmeriCorps

Facilitated and managed a residential AmeriCorps program with 13 members

2004 – 2005 Member, AmeriCorps
Barnstable, MA AmeriCorps

Performed over 1700 service hours in a national residential program focusing on the areas of land conservation, water conservation, environmental education, and disaster preparedness

EDUCATION

2013 – Present Pursuing Master of Business Administration w/emphasis on Emerging Markets
University of Liverpool Online

2002 – 2004 Graduate Hydrogeology Classwork
Iowa State University

Jesse Bermel
jessebermel@gmail.com

1999 – 2002 Bachelor of Science in Environmental Science
Iowa State University

1997 – 1999 Associate of Science in Biology
Muscatine Community College

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TATANKA RIDGE WIND, LLC, FOR A PERMIT FOR A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH DAKOTA, FOR TATANKA RIDGE WIND FARM

SD PUC DOCKET EL _____

PRE-FILED DIRECT TESTIMONY OF DANIEL FLO,
AND BARR ENGINEERING CO.,
ON BEHALF OF TATANKA RIDGE WIND, LLC

June 17, 2019

TABLE OF CONTENTS

I. Witness Introduction.....1

II. Purpose and Coverage of Testimony.....2

Q. Please state your name, employer and business address for the record.

A. Daniel Flo, Senior Environmental Consultant, Barr Engineering Co., 4300 MarketPointe Drive, Suite 200, Minneapolis, MN 55435.

Q. Briefly describe your educational background.

A. I received a Bachelor of Science degree in 1996 from Minnesota State University, Mankato, with a Major in Geography and a Minor in History. I then received a Juris Doctor degree from Lewis & Clark Law School in Portland, Oregon in 2002.

Q. Briefly describe your professional experience.

A. I have more than 15 years of experience in environmental permitting, environmental review, and regulatory compliance, largely related to large energy generation and transmission projects. I have managed or advised teams of consultants on state and local permitting, acoustical studies, wetland and waterbody surveys, habitat assessments, cultural resources surveys, and other related services for a dozen wind projects in the Dakotas and the Midwest. My educational and professional specialties are in environmental law and land use, environmental review and permitting, and project management.

Q. Have you attached a resume or CV.

A. Yes, my resume is attached.

Q. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

A. No, I have not.

Q. What is the purpose of your direct testimony?

A. The purpose of my Direct Testimony is to provide information concerning existing environmental conditions in the area of the proposed Project ("Project Area"), potential impacts of the Tatanka Ridge Wind, LLC (Tatanka Ridge) Project on the existing environment, and how the Project will avoid, minimize, and/or mitigate potential impacts. In doing so, I am sponsoring several sections of the application, including:

Section 6.0 – Environmental Information

Section 7.2 – Soil Resources

Section 8 – Hydrology

Sections 11.1 – Land Use and Ownership

Section 11.2 – Recreation, Public Facilities, and Conservation Easements

Section 11.4 – Visual Resources

Section 13 – Water Quality

Section 14 – Air Quality

Section 16.5 – Cultural Resources

Section 22 – Additional Information

Q. Are you responsible for Section 6.1 of the application? What information is contained in that section?

A. Section 6.1 presents information on other energy conversion or transmission facilities and SDPUC-regulated projects in the Project area. There is one energy transmission facility

currently in operation, one under construction, and one energy conversion facility that will begin construction soon. The operational facility is a natural gas pipeline and associated compressor station that are regulated by the Federal Energy Regulatory Commission. In addition, a 345 kV electric transmission line is currently under construction just east of the Project area, and a 250 MW natural gas-fired power plant will be constructed near the Project and is expected to begin operation in 2021.

Although wind farms are not considered "energy conversion facilities" for the purposes of SDCL 49-41b-2(6), we also discuss that there is one wind project currently in operation 1.5 miles south of Tatanka Ridge, and another is proposed for construction northeast of Tatanka Ridge.

Specifically with regard to the cumulative effects of energy conversion facilities according to the state's definition, no negative impacts are anticipated, while cumulative beneficial impacts in the form of increased state and local tax revenue and local spending during construction are expected to occur.

Q. Please describe the farmland in the area?

A. Approximately 73.2 percent of the soils in the Project Area are classified as prime farmland and approximately 10.8 percent of soils are classified as not prime farmland (Table 7-2; Figure 14). Approximately 4.6 percent of the Project Area soils are classified as farmland of statewide importance. The remaining soils within the Project Area are considered prime farmland if drained (10.8 percent) or prime farmland if irrigated (0.6 percent).

Q. Are there expected impacts to soils?

A. Yes. Construction activities such as clearing, grading, trench excavation and backfilling, as well as the movement of construction equipment within the construction

workspace, may result in impacts to soil resources. Potential impacts on soil resources include soil erosion, soil compaction, reduction of soil fertility, and changes to other soil characteristics. Clearing removes protective cover and exposes soil to the effects of wind and precipitation, which may increase the potential for soil erosion and movement of sediments into sensitive environmental areas. Grading and equipment traffic may compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. Contamination from release of fuels, lubricants, and coolants from construction equipment could also impact soils. The majority of these impacts are temporary and related to construction activities, and can be minimized through the use of best management practices (BMPs). However, there will be permanent impacts associated with aboveground facilities.

Table 7-2 provides a summary of farmland types that will be affected by the Project. Land impacted by the installation of turbine foundations, the Project substation, operation and maintenance buildings and permanent access roads will be converted to impervious surfaces, thereby resulting in long-term operational impacts to soil resources at these locations. These permanent impacts represent only 1.9% of the prime farmland in the Project area.

Q. What impact avoidance and minimization measures will be used for soil resources?

A. Wind facilities are predominantly designed with turbines situated at higher elevations to minimize obstructions to wind. The current layout sites access roads away from steep slopes to the degree possible. The underground collector lines also avoid crossing steep ravines. Geotechnical soil borings will be conducted at wind turbine foundation locations prior to construction to determine the soil suitability to support turbine foundations. This information will help dictate final design parameters of the turbine and structure foundations.

During construction, the Project's construction contractor will use BMPs to stabilize

soils and prevent erosion and sedimentation, including the use of silt fence, straw mulch, erosion control blankets, and other materials that prevent the movement of water and soils off of slopes and into low-lying areas or other environmentally sensitive areas. The contractor will also use rock pads to minimize the tracking of soils off of the project site, and will follow the Project Spill Prevention, Control and Countermeasures (SPCC) Plan to prevent the contamination of soils from construction equipment.

Q. What permits are required for construction related to impacts on soils?

A. Construction of the Project will require coverage under the South Dakota Department of Environment and Natural Resources (SDDENR) General Permit for Storm Water Discharges Associated with Construction Activities. To maintain compliance with provisions of this General Permit, Tatanka Ridge will prepare a Stormwater Pollution Prevention Plan (SWPPP) to identify potential sources of stormwater pollution from the Project Area and specify BMPs to control erosion and sedimentation and minimize negative impacts caused by stormwater discharges from the Project. The SWPPP will be prepared prior to construction of the Project. The SWPPP will be implemented from the initiation of construction and will remain in effect until final stabilization is achieved. Once construction has been completed, Tatanka Ridge will backfill graded and excavated areas with the stored native material and return the construction area to pre-construction conditions. During Project operation, stormwater volume, stormwater flow and erosion and sediment impact to surface water and groundwater resources are not anticipated to change from pre-construction conditions.

Q. Do local ordinances for protection of soils apply to the Project?

A. Yes. Section 1215.03 1.f.vi of the Deuel County Zoning Ordinance requires that a Large Wind Energy System (LWES) develop a Soil Erosion and Sediment Control (SESC) Plan prior

to construction and submit the plan to the County Zoning Office. The Ordinance outlines several components required in the plan including but not limited to: plans for revegetation, grading, minimizing area of disturbance, maintaining downstream quality, and similar requirements. The Tatanka Ridge Project's SESC Plan was provided to Deuel County in April, 2019, as an attachment to the Project's Wind Energy System and Special Exception Permit applications and was accepted by the county upon the approval of the county permits on June 11, 2019.

Q. Has the Project considered impacts on groundwater resources?

A. Yes. Construction of the Project is not anticipated to have any long-term impacts on groundwater resources. Disturbances associated with Project construction of roads and collector lines are primarily limited to the upper 3 to 6 feet of the ground surface, with excavations for turbine foundations reaching up to 10 feet in depth. Most of the aquifers in the Project Area are at least 50 feet below the ground surface, and are typically encountered at 100 feet below ground surface. Construction activities such as trenching and backfilling and dewatering that encounter shallow groundwater may result in negligible to minor short-term and very localized fluctuations in groundwater levels depending on the proximity and connectivity of groundwater and extent of the excavated area. Once the construction activity has been completed, the groundwater levels typically recover quickly.

Q. What about potential impacts to surface waters and wetlands?

A. Tatanka Ridge has conducted wetland and waterbody delineations within the Project Area according to the USACE Wetlands Delineation Manual, Great Plains Regional Supplement (Environmental Laboratory 1987), and is continuing these field surveys this summer (2019). The results of the wetland and waterbody delineations will be used to refine Project design elements in order to avoid and minimize potential impacts. All field surveys and survey reports are

expected to be complete by September of 2019.

Temporary and long-term operational impacts to surface waters and wetlands are discussed in Section 8.2.2. Construction activities in the vicinity of these waterbodies and wetlands have the potential to temporarily increase sedimentation due to erosion and from changes in runoff patterns and water volumes due to increased impervious surfaces.

Q. How will impacts to surface waters and wetlands be avoided or minimized as a result of Project design and later during Project construction?

A. Turbines and the meteorological tower will be constructed on higher elevations within the Project area to maximize the wind resource and are not located within wetlands or waterbodies. Access roads, collector systems, the O&M facility, the collection substation and interconnection switching station were designed to avoid or minimize impacts to wetland and waterway features whenever feasible. Temporary impacts associated with crane paths will also be minimized. In the Big Sioux watershed, Tatanka Ridge will install collector lines across waterbodies using trenchless techniques to avoid in-stream impacts. Where crossings of streams and drainageways cannot be avoided by access roads, appropriately designed crossings (i.e., culverts, low-water crossings) will be constructed to maintain existing drainage. In the Big Sioux watershed, such stream crossings will also be designed to maintain fish passage. If construction in or through wetlands must occur, the use of timber mats is a BMP to minimize the temporary impacts to those wetlands.

Tatanka Ridge will avoid impacts to the extent practicable through the use of BMPs during construction. Impacts that do occur are anticipated to be short term and localized. As described in Section 8.2.3, for surface water and wetlands, BMPs will be designed and implemented to control sedimentation and erosion during the construction phase of the Project.

The BMPs may include silt fence, erosion control blankets, temporary stormwater sedimentation ponds, revegetation and/or other features and methods designed to control stormwater runoff and mitigate erosion and sedimentation. The BMPs will be implemented to reduce the potential for impacts to drainage ways and streams by sediment runoff. Because erosion and sediment control will be in place for construction, operation, and decommissioning of the Project, impacts to water quality are not expected to be significant.

The potential for fuel spills during construction and operation will be minimized by adhering to the procedures outlined in the Project's SPCC Plan. Such spill avoidance and impact minimization measures include the use of secondary containment for any on-site fuel storage; regular inspection of secondary containment, tanks, and hoses; and ensuring that any refueling activities that occur away from permanent facilities do not happen within a specified distance of wetlands and waterbodies, and only on impervious surfaces unless secondary containment is used.

Because no significant or long-term impacts to surface waters and wetlands are expected, no formal mitigation of these resources will be required.

Q. Please discuss land uses in the project area.

A. The following land use classifications occur within the Project Area: agricultural, including cultivated croplands (70.8%) and pastures and hay (2.8%); developed lands (4.1%); and natural areas (22.3%). Natural areas include grasslands, open water, wetlands, and wooded wind breaks. See also Direct Testimony of Janelle Rieland for a discussion of Native Undisturbed and Non-Native Undisturbed Grasslands. Occupied farm sites and rural residences are scattered throughout the Project Area. There are 129 occupied and presumed occupied residences within one mile of and including the Project Area, but not including the town of

Toronto, which is entirely within a one-mile buffer of the Project boundary.

Q. What steps will the Applicant take to avoid or minimize impacts to existing land uses?

A. Project construction will result in conversion of only a small portion of the land within the Project Areas from existing land uses to the proposed Project uses. Following completion of construction, the construction contractor will coordinate with landowners and the NRCS regarding the appropriate seed mixes to use for revegetation of temporarily impacted areas, or in the case of cultivated lands, no seed mix use at all. Seed mixes, revegetation, and similar activities related to the SWPPP are discussed in sections 7.2 and 8.2.

Q. Describe the Project area with regard to recreation, public facilities, and conservation easements?

A. The Project area does not include any designated recreation areas. It does include public facilities in the form of one SDDOT maintenance facility and the Toronto cemetery. There are also five USFWS conservation easements within the project area, including one grassland easement and four wetland easements.

Q. How will the Project avoid impacts to public facilities and conservation easements?

A. Tatanka Ridge carefully selected the proposed wind turbine, crane path, collector line, and access road locations to avoid or minimize direct impacts to protected wetlands and grasslands. The proposed wind turbine locations are all within upland areas and not located within wetlands. The USFWS easements do not allow impacts to protected grasslands or 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 (See Figure 3). 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.

The two public facilities will be avoided by all project construction and operations.

Q. Please discuss the visual impacts of the Project.

A. Tatanka Ridge has collocated linear Project features such as access roads and collector and communication systems with existing disturbances where possible. This is consistent with the South Dakota Bat Working Group's and South Dakota Department of Game, Fish and Parks (SDGFP's, Undated) Siting Guidelines for Wind Power Projects in South Dakota for reducing impacts to visual resources. Similarly, operation of the Project will not introduce new visual components into the Project vicinity. The Project vicinity already includes wind turbines from the Buffalo Ridge II Wind Project, as well as existing electrical transmission lines.

The magnitude of visual impacts associated with the Project will depend on several factors, including:

Distance of the proposed Project Facilities from viewers;

Duration of views (highway travelers vs. permanent residents);

Weather and lighting conditions;

The presence and arrangements of lights on the turbines and other structures; and

Viewer attitudes toward renewable energy and wind power.

To minimize visual impacts of the Project, Tatanka Ridge has incorporated setback requirements and commitments into the design of the Project (Table 12-1). In accordance with Federal Aviation Administration (FAA) regulations, the towers will be painted to reduce potential glare and minimize visual impact.

In addition, Tatanka Ridge is electing to use an Aircraft Detection Lighting System

(ADLS) for the Project as an alternative to traditional obstruction lighting for turbines that flash continuously on a set interval. ADLS is a sensor-based system designed to detect aircraft as they approach the Project area. The system will automatically activate the warning lights on each turbine until the aircraft leaves the area. ADLS does not require additional equipment in an aircraft. Tatanka Ridge is currently searching for an FAA-approved ADLS vendor, after which it will determine the planned locations of the associated radar installations.

Q. Is the Project anticipated to impact existing water quality?

A. As discussed in the sections discussing surface water and groundwater, above, the Project is not anticipated to have significant or long-term impacts to water quality.

On June 3rd, 2019, Jesse Bermel received a letter from Shannon Minerich at the South Dakota Department of Environment and Natural Resources, Surface Water Quality Program, in response to a request for comments on the proposed Project. The letter outlines four water quality-related issues for the Project to be aware of prior to and during construction. Tatanka Ridge has addressed how these potential impacts will be avoided or minimized throughout the application and in other sections of this testimony, and that of other application sponsors.

Q. What impacts from construction are anticipated to air quality in the area?

A. As found in Section 14, temporary construction impacts include fugitive dust emissions and short-term emissions from diesel trucks and construction equipment. Temporary impacts will occur if a concrete batch plant is used during construction. Any air quality effects resulting from construction will be short term and limited to the time of construction activities and will not result in North American Ambient Air Quality Standards (NAAQS) exceedances for particulate matter or significantly contribute to greenhouse gas emissions.

The Project received an Air Quality Determination from the South Dakota Department of

Environment and Natural Resources dated May 7, 2019, stating that "the project will have little or no impact on the air quality in this area. This project is approved."

Q. What are "cultural resources?"

A. Cultural resources refer to the remnants of past human activity on the landscape, including historical architecture, pre- and post-contact Native American artifacts, dwelling sites, and other material remains.

Q. With respect to cultural resources, what steps has Tatanka Ridge taken to identify cultural resources within the Project site?

A. Tatanka Ridge hired an archaeological services consulting firm, HDR Engineering (HDR), to conduct research to identify known historic sites and other cultural resources within and near the Project area. Project designs considered the locations of these known sites, whether they had been evaluated for their eligibility for listing on the National Register of Historic Places (NRHP) or not, and avoided those sites.

In addition, HDR is conducting a Level III archaeological survey of all portions of the survey corridor. This survey is ongoing and the results will be reported to the PUC and the South Dakota State Historical Society once those efforts are complete.

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, there are five previously identified sites that intersect the Project survey corridor. All five sites were either not found during surveys, or will be avoided during Project construction. All five sites remain unevaluated for listing on the NRHP.

Q. In addition to Energy Facility Permits, what other permits are required for the

Project?

A. Various federal, state, and local approvals will be required for the Project. Table (22-1) in the Application identifies potential permits or approvals that may be required for the construction and operation of the Project, and also identifies the status of each permit or approval.

Q. Please discuss the Applicant's agency coordination efforts.

A. As discussed in Section 22.2 of the Application, as part of Project development and the permitting process, the Applicant has coordinated with various federal, state, and local agencies regarding the Project. Numerous meetings and discussions have been held with USFWS and South Dakota Game, Fish and Parks regarding avoidance and minimization of potential impacts to wildlife and associated habitat. Agency coordination will continue throughout the permitting process and, as needed, during Project construction and operation.

(end of DSF testimony)

Dated this 17th day of June, 2019.

/s/

Daniel Flo, for TATANKA RIDGE WIND, LLC

Experience

Dan has more than 15 years of experience with environmental review and permitting for a variety of natural resources projects involving renewable energy development, electric transmission, mining, oil and gas transmission, and refineries. He manages large- and small-scale development that involve agency coordination, environmental field surveys, major permitting, environmental review, construction, and restoration. His background also encompasses new-project feasibility studies, routing and siting, permitting strategies, project scheduling, public outreach planning, risk analysis, and business development.

Dan's renewable-energy and electric-transmission project work includes:

- Providing regulatory guidance and project management to Barr's acoustics engineers for post-construction sound modeling and monitoring services on behalf of Palmer's Creek Wind Farm, LLC, in Chippewa County, Minnesota.
- Managing a residence survey conducted for Avangrid Renewables' Fox Lake wind farm in Martin County, Minnesota.
- Managing site permitting for Avangrid Renewables' Tatanka Ridge wind farm in Deuel County, South Dakota. A 154 MW wind energy facility, Tatanka Ridge will require site permits from both Deuel County and the South Dakota Public Utilities Commission. Barr's work includes preparing county and state site-permit applications; a survey to confirm the locations of occupied residences in support of project layout; and developing a decommissioning plan. Barr will also help prepare pre-filed testimony and exhibits supporting the state permitting process and Public Utilities Commission hearings.
- Serving as Barr's senior regulatory advisor for post-construction sound modeling and monitoring studies for the Big Blue wind farm in Faribault County, Minnesota.
- Providing senior regulatory advice on environmental permitting and support for a proposed wind farm in Michigan's Upper Peninsula. Barr's scope of work included a transmission-line routing analysis; a cultural resources review of the wind farm and associated transmission line; incorporation of data from an existing constraints-impact analysis; a summary of Michigan's wetland and water-body permitting requirements; and township site permitting.
- Serving as Barr's senior regulatory advisor for Avangrid Renewables' Trimont wind farm repowering project in Martin and Jackson counties, Minnesota, which received the first partial-repowering site-permit amendment in the state. Barr's scope of work included working with the Minnesota Department of Commerce to determine permit application requirements and timelines. The firm also provided agency consultation, prepared a decommissioning plan, and managed preparation and submittal of the application to the agency. Dan continues to assist Trimont with post-permit compliance.
- Providing senior regulatory advice on Allete Clean Energy's Lake Benton 1 upgrade project in southwestern Minnesota, which received the state's second partial-repowering site-permit amendment. Barr's scope of work included working with the Minnesota Department of Commerce to determine permit application requirements and timelines; managing preparation and submittal of the permit application to the Department

of Commerce; and consulting with regulatory agencies about avoiding wetlands and protected habitat.

- Assisting with due diligence review on behalf of Allete Clean Energy for wind-farm repowering projects in Iowa and Minnesota.
- Managing environmental permitting and review activities for Allete Clean Energy's "Clean Energy One" project, a 100 MW wind-energy development. Work included directing cultural and biological field surveys; obtaining site approval from the state's public-service commission; preparing a stormwater pollution-prevention plan (SWPPP); and completing applications for North Dakota Pollutant Discharge Elimination System (NDPDES) and county permits.
- Serving as project manager for Minnesota Power's Bison 2 and 3 wind projects in North Dakota, including managing cultural and biological field surveys, obtaining site approval from the Public Service Commission, preparing an NDPDES permit application and SWPPP; and applying for local permits.
- Managing the route permitting team for the CapX 2020 Fargo-to-Monticello 345kV transmission-line project, which runs from Fargo, North Dakota, to Monticello, Minnesota. Work included overseeing technical specialists, contributing to the environmental routing analysis, and participating in outreach meetings with public officials and land owners in Minnesota and North Dakota.
- Participating on the project team that developed a routing and environmental facility study for a confidential client's proposed 500kV transmission-line project.

Dan's other recent work includes:

- Managing environmental and engineering services for American Peat Technology's PEAT (Pioneering Environment Agriculture Technology) project, a 600-acre peat mine and processing plant in Aitkin County, Minnesota. Barr's assistance includes mine engineering and design for a dredge-and-slurry peat mining operation, as well as civil, structural, and electrical engineering and design of a new peat-processing facility in support of the state environmental-review process. Barr is also providing surface- and subsurface-hydrology modeling; preparing and implementing a water-level monitoring plan; developing a water-quality monitoring plan and conducting field sampling; preparing the water resources section of the project's Minnesota Environmental Assessment Worksheet; and participating in state agency meetings.
- Participating on a client's working team to evaluate the regulatory and schedule implications of seeking an energy-facility site permit from the Minnesota Public Utilities Commission for installing a 57 MW combined heat-and-power, natural gas–fired combined-cycle power plant.
- Managing teams of resource specialists preparing and presenting expert testimony, on behalf of the Iowa Office of Consumer Advocate and South Dakota Public Utilities Commission, concerning reviews of state-permit application materials and potential environmental impacts, mitigation, and restoration methods for the Dakota Access Pipeline project.

- Preparing direct testimony and presenting expert testimony on behalf of the South Dakota Public Utilities Commission in connection with TransCanada's application for state certification of the Keystone XL project and an evaluation of changes since the 2009 testimony.

Education

JD, Lewis & Clark Law School, 2002

BS, Geography, Minnesota State University, Mankato, 1996

Training

"Environmental Review and Compliance for Natural Gas Facilities" (2017 FERC seminar)

Certifications

University of Minnesota–certified erosion- and sediment-control specialist; inspector and installer; and designer of stormwater pollution-prevention plans (2009)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY AVANGRID RENEWABLES, INC. FOR A PERMIT FOR A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH DAKOTA, FOR TATANKA WIND FARM

SD PUC DOCKET EL _____

PRE-FILED DIRECT TESTIMONY OF MARK MULLEN, ON BEHALF OF TATANKA RIDGE WIND, LLC

June 17, 2019

TABLE OF CONTENTS

I. Witness Introduction.....1

II. Purpose and Coverage of Testimony.....3-4

Q. Please state your name, employer and business address for the record.

A. My name is Mark Mullen and I am a Regional Director – Engineering with Avangrid Renewables, LLC., the Owner of Tatanka Ridge Wind Project, LLC. My office location is 1125 NW Couch Street, Suite 700, Portland, OR 97209.

Q. Briefly describe your educational background.

A. I have a Bachelor of Science in Civil Engineering from Colorado State University (1982) and a Master of Business Administration from the University of Phoenix (1988). I am a registered Professional Engineer in the State of Colorado (No. 25480).

Q. Briefly describe your professional experience.

A. I have been employed in the energy industry for over 35 years, providing engineering, project management, and development support to nuclear, gas, coal, ethanol, wind and solar facilities. I have been employed by Avangrid Renewables for approximately 10 years, providing technical support to the development of both wind and solar generation projects, including the Tatanka Ridge Wind Project.

Q. Have you attached a resume or CV.

A. Yes, my resume is attached.

Q. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

A. No, I have not.

Q. What is the purpose of your direct testimony?

A. My testimony will support the portions of the application which discuss and illustrate the construction and potential decommissioning of the project. Those sections are 4, 7.0-7.1.7, 11.6, 19, and 20.

Q. What type of foundation will be used?

A. Although the final design is not yet complete, Tatanka Ridge plans to use a spread footing foundation design. Foundations for the towers will be approximately 60 feet in diameter, with a depth of approximately 10 feet, and will use approximately 300-400 cubic yards of concrete. Except for approximately 6 inches that will remain aboveground to allow the tower to be appropriately bolted to the foundation, the tower foundation will be underground. A specific foundation design will be chosen based on a geotechnical investigation conducted at each turbine location.

The excavated area for the turbine foundations will typically be approximately 90 feet in diameter. During construction, a larger area approximately a 200-foot radius may be used to store turbine components and material, lay down the rotors, and maneuver cranes and equipment during turbine assembly. The final limits of disturbance will be determined by the Contractor and subject to easement and permit conditions.

Q. How will construction impact the roads in the project area?

A. Where practicable, existing public roads, private roads and field paths will be utilized to access Project components. The existing roads may require improvements before, during or following construction. Where necessary, new access roads will be constructed between existing roadways and Project components. The new and improved access roads will be all-weather, gravel surfaced and generally up to approximately 16 feet in width. During construction, some of the access roads will be widened to accommodate movement of the turbine erection crane, with temporary widths of up to 50 feet.

Separate access may be required for the cranes used to erect the wind turbines. In such cases, temporary crane paths will be utilized between turbine locations. Following completion of

construction, the temporary crane paths will be restored pursuant to the contractual easement obligations. The final access road design will be dependent on geotechnical information obtained during the engineering phase.

Large construction cranes may spend as little as one day at each turbine site before moving on to the next. Cranes are sometimes moved cross-country rather than by using the developed access roads. There are a number of reasons for such cross-country movement including efficiency and economics. Taking a more direct route saves time. Breaking down the crane is time-consuming and costly. This type of cross-country walking enables the crane to be moved without complete de-rigging and disassembly. Walking cranes on county roads or state highways is generally avoided as that could impede traffic and damage roads. Where cranes are required to travel cross-country, workers may lay down some form of cribbing, bedding or mats to support the weight of the crane depending upon the underlying ground conditions. The cribbing or mats will be removed following passage of the crane, to be re-used elsewhere.

Q. Will the project utilize a laydown area? If so, what can you tell us about that?

A. Tatanka may grade a temporary laydown/staging areas of up to approximately 10 acres within the Project Area on land under lease (Figure 2). Two potential locations for the laydown/staging area have been identified. Should an O&M facility not be constructed within the Tatanka Ridge site, the area identified for the O&M facility may also be utilized as a construction laydown/staging area. The laydown/staging area will provide parking for construction personnel, staging area for equipment and material deliveries and potentially maintain an on-site temporary concrete batch plant during construction. If a temporary batch plant is determined to be required for the Project, to supply concrete for foundations onsite, it will be strategically placed to avoid cultural resources and other known constraints and will

temporarily impact approximately 5 acres of the 10-acre laydown/staging area.

The laydown/staging area will also be used to conduct minor maintenance on construction equipment and vehicles and to store fuel. On-site fuel storage will have secondary containment and will be inspected regularly, with containment being remediated promptly in accordance with the Project's Spill Prevention, Control and Countermeasures (SPCC) Plan. Fuel handling activities and spill remediation will also adhere to the procedures outlined in the Project's SPCC Plan.

Q. Will you construct an operations and maintenance facility?

A. Possibly. Tatanka Ridge will either utilize an existing O&M facility at the Coyote Ridge Wind Farm in Brookings County, or construct a new facility within the Tatanka Ridge site. If constructed on the Tatanka Ridge site, the O&M facility will be located within the Project Area, in a location with proper transportation, communications facilities and ease of access to Project facilities (Figure 2). Construction of the up to 5-acre O&M facility will require a building permit from Deuel County. O&M buildings are typically approximately 5,000 square feet and house the equipment and personnel necessary to operate and maintain the Project. Ambient conditions within the O&M facility will need to be maintained to meet equipment operating requirements and/or to support the presence of maintenance personnel. Heating may be provided by propane stored on site. Although the electric power demands of the O&M building and the operating equipment will be supplied from the grid, emergency power generation may also be available on-site via a diesel/propone engine/generator set.

There is a possibility that a new O&M facility may not be constructed on site and those services may be housed in an adjacent wind project facility. Should this option be selected, the O&M site identified may be used as a laydown/staging area as described previously.

Q. What will the project use to connect the towers electrically?

A. The proposed collector system layout based on the proposed turbine configuration is shown on Figure 2. From the step-up transformers, power will run through an underground and/or overhead system of collection cables, junction boxes, and electrical equipment, referred to as a collector system, that connects to the Project collection substation. Up to 46 miles of underground circuits may be installed by trenching, plowing or, where required, directionally boring the cables underground to avoid sensitive environmental conditions or meet other requirements. Generally, the electrical collector lines will be buried with marking tape to meet the appropriate electrical code. Tatanka will register the appropriate underground facilities with the South Dakota One-Call system.

Up to 10 miles of overhead collector may be installed instead of underground collectors at that location. Up to three overhead circuits may be constructed and supported on single poles along the overhead collector route.

Q. Will communications systems connect the towers? If so, tell us about them?

A. When installing the collector system, Tatanka will also install fiber optic communication systems connecting each of the Project's wind turbines to the Project collection substation and provide for communication among the wind turbines, collection substation, O&M facility and electrical grid as part of SCADA (see Section 4.2.6). If underground, the electrical and fiber optic cables will be placed in the same trench wherever possible and may include occasional aboveground junction boxes.

Q. What type of substation will be used by the project?

A. The collection substation will be located on the east side of the Project Area and will consist of a main power transformer, circuit breakers, switching devices, auxiliary equipment, a

control enclosure containing equipment for proper control, protection, monitoring and communications and associated equipment and facilities. The principal function of the substation is to increase the voltage from the 34.5 kV at the collector system to the voltage of the 345 kV transmission line, which will transport the electricity of the entire Project to the grid via the interconnection switching station. The collection substation will be located within a fenced area. The fence will be designed in accordance with industry standards to provide safety and security.

Up to 5 acres of land will be leased or purchased to facilitate construction and operation of the collection substation. As discussed in Section 4.2, Tatanka requests that the permit allow Project facilities, including the collection substation, to be modified as needed provided that the new locations are on land leased for the Project, cultural resource impacts are avoided and conditions specified in the Energy Facility Permit.

Q. What land requirements have you identified?

A. Temporary construction and long-term operational land requirements are identified in Table 4-3.

Q. Please briefly describe the construction process.

A. Construction is expected to require a period of between 9 to 16 months to complete. Tatanka anticipates beginning construction as early as possible in the spring of 2020 and completing construction by December of 2020. In general, the construction process will begin with the clearing and grading of laydown/staging areas, roads, O&M facility, and project substation sites. Work will then commence on the construction of access roads and excavation and construction of turbine foundations. Substation, collector system, and O&M facility construction will also be commencing. Once the turbine foundation concrete has cured sufficiently, turbine erection will commence. Following the completion of turbine erection and

facilities construction, turbine commissioning and plant startup will begin. Once commissioning and startup is complete, site restoration activities will be completed.

Q. Have you identified impacts to the surrounding residents and communities from construction? If so, please discuss them.

A. During the construction phase, temporary impacts are anticipated on some public roads in the vicinity of the Project Area, however local traffic will continue to have safe access though the area. Roads will be affected by the transportation of equipment to and from the Project. Construction traffic will use the existing township, county and state roadway system to access the Project and deliver construction materials and personnel. During the construction phase, several types of light, medium and heavy-duty construction vehicles will travel to and from the Project Area, as well as private vehicles used by construction personnel. Some roads may also be temporarily expanded along specific routes as necessary to facilitate the movement of equipment.

Construction activities will increase the amount of traffic using local roadways, but such use is not anticipated to result in adverse traffic impacts. Project personnel and contractors will be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types and site-specific conditions to ensure safe and efficient traffic flow. The Project will obtain road use agreements prior to starting construction.

Q. How many workers will you need? Where will they live during construction?

A. The Project is expected to employ approximately 200 temporary construction workers during an estimated 8-month peak construction period to support Project construction. It is likely that general skilled labor is available in the surrounding counties or the state to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for

certain components of Project construction. It is likely that this labor will be imported from other areas of the state or from other states, as the relatively short duration of construction makes special training of local or regional labor impracticable.

The estimated number of construction jobs by classification and annual employment expenditures during construction are included in Table 17-1; however, the exact number of jobs during the peak of construction may be higher.

Q. Can you speak about decommissioning?

A. Yes. A Decommissioning Plan and estimated cost analysis was prepared for the Project and is included in Appendix R. The estimated net decommissioning costs for the Project are summarized in Table 4 of the Decommissioning Plan. The net decommissioning cost (in 2018 US dollars) is estimated to be $4,989,020 assuming salvage and no resale of Project components. The current cost of decommissioning the Project is estimated to be approximately $89,090 per turbine. This cost includes a partial offset from the salvage value of the towers, turbine components and electrical equipment. The detailed reclamation cost estimate is provided in Table 3 of the Plan.

Q. How will you coordinate activities with local emergency response?

A. Tatanka and its construction team will coordinate with first responders, including but not limited to air ambulance, local sheriff's office(s) and local fire services to develop an emergency management plan during construction and operation of the Project. Tatanka will also be in contact with local first responders to offer information about the Project and to answer any questions response teams may have regarding Project plans and details.

Q. Please describe the regional landforms of the proposed project area.

A. 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 feet in the vicinity of the project site and can generally be considered an approximate depth of materials overlying bedrock.

Q. What is the underlying geology of the region?

A. The surficial geology of the Project area consists of Quaternary and Upper Wisconsin glacial deposits. **Error! Reference source not found.** illustrates the surficial geology present within the Project area. Below the surficial deposits, a layer of glacial deposits occurs about 700-800 feet 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. 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 feet 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. The total thickness of the Pierre Shale in Deuel County is less than 100 feet. **Error! Reference source not found.** shows the bedrock geology relative to the Project area.

Q. Is there significant risk of seismic activity or subsidence in the area?

A. No, 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. Furthermore, there are no active or inactive faults in the Project area vicinity. 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.

Q. Are there expected impacts on local geological conditions?

A. The geologic conditions within the Project Area are appropriate for the construction of the Project and will result in negligible impacts on geologic resources. Excavation, bearing and groundwater conditions are anticipated to be conducive to construction and operation of the Project facilities.

Q. Are there expected impacts to existing communication infrastructure?

A. No. Tatanka Ridge hired a consultant to conduct an analysis in 2019 to identify all communications towers and FCC-licensed communication antennas that exist in the Project vicinity (Appendix K). Additionally, a consultant was hired to identify licensed and applied coordinated non-federal microwave paths that could limit the placement of the Project wind turbines (Appendix L). This consultant also conducted an analysis in of AM and FM radio broadcast stations within 30 kilometers (km, 18.6 miles) of the Project (Appendix M). The results of these analyses show that Project will not adversely impact existing communication infrastructure.

Q. Are there expected impacts from stray voltage associated with the project?

No. 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. Tatanka Ridge will take measures, such as proper grounding, to

prevent stray voltage.

Dated this 17day of June 2019.

/s/

Mark Mullen

MARK P. MULLEN, P.E.

SUMMARY OF QUALIFICATIONS

Over 35 years of hands-on project experience in the energy industry. Capabilities encompass a broad spectrum of activities including all aspects of project management as well as green-field development and construction, plant expansion and modification, due diligence, and plant operations. Extremely strong project management skills demonstrated by successful completion of numerous and diverse energy related projects.

PROFESSIONAL EXPERIENCE

11/09-Present Avangrid Renewables Portland, OR

Regional Director

- Provide engineering, technical, and project management services to Iberdrola's development and origination business in the western US. Services include preliminary civil and electrical engineering, site feasibility review, permitting support, due diligence reviews, and technology research. Responsible for establishing and maintaining scope, cost, and schedule.

2/08-10/09 EdeniQ, Inc. Vancouver, WA

Vice President, Projects

- Responsible for development of pilot and demonstration scale plants associated with next generation (cellulosic) fuel ethanol plants. Managed integration and installation of new technology into existing ethanol plants. P&L responsibility for subsidiary company involved in green waste/biomass recycling and composting.

6/06-2/08 Altra, Inc. Vancouver, WA

Vice President, Projects

- Managed green-field development of fuel ethanol production plants in numerous states. Activities included site selection, permitting, design, and contractor selection. Oversaw construction of three ethanol plants simultaneously via three separate EPC contracts and contractors.

2002-6/2006 Baard Energy Vancouver, WA

Vice President

- Responsible for managing all facets of project development for liquid and solid fueled IGCC power plants, green-field fuel ethanol and biodiesel production plants, in addition to coal-to-liquid fuel production plants. Responsible for site selection, scope definition, permitting, EPC contractor selection and contract negotiation, construction project management, negotiation of offtake agreements and negotiations with equity and debt participants. Ultimate responsibility for project schedule and budget.

1997-2001 Enron North America Portland, OR

Director

- Provided project management and technical support on a wide variety of energy projects for the Enron West-Desk Power Origination Team. Managed and performed project development activities for green-field and brown-field power plants of varying technologies as well as expansion/re-powering projects at existing sites. Areas of responsibility included project scope definition, budgeting, environmental permitting, land use and local permitting, major equipment selection and procurement, EPC contract negation and administration, as well as engineering and construction oversight.

- Organized and managed numerous due diligence teams tasked with evaluating existing assets for potential purchase. Led technical teams in the evaluation of industrial customer's operations, resulting in energy optimization and maximization of power production. Assisted in preparing responses to numerous generation RFPs. Performed preliminary plant performance modeling (using GT Pro) for the evaluation of potential generation sites with various plant configurations. Provided ongoing asset management of company owned generating assets.

1995-1997 First Point Convergent System Portland, OR

Supervising Project Manager

- Performed as project manager on a diverse scope of projects for a start-up company providing high-voltage construction and maintenance services to the public and private sectors. In addition to comprehensive project management, duties included responding to RFPs, project estimating, and development of a subcontractor network.

1992-1995 Portland General Electric Portland, OR

Senior Licensing Engineer

- Responsible for a broad spectrum of licensing and permitting activities associated with the ongoing operation, maintenance and decommissioning of a nuclear generating plant. Project manager for a number of large, complex, one of a kind decommissioning activities. Effectively utilized communication and negotiating skills to interact with federal and state regulators, as well as numerous other stakeholders, on a daily basis in support of plant objectives.

1983-1992 Public Service Company of Colorado Denver, CO

Project Manager/Professional Engineer

- Provided project management on a number of large capital expansion projects at a nuclear generating facility including the licensing, permitting, design and construction of a one of a kind Independent Spent Fuel Storage Installation. Responsible for multiple facets of project management and engineering support for the ongoing operation and maintenance of the plant.

EDUCATION

1988 University of Phoenix
Master of Business Administration

1982 Colorado State University
Bachelor of Science in Civil Engineering

PROFESSIONAL REGISTRATION

Professional Engineer, State of Colorado No. 25480

PUBLICATIONS

"Floor Response Spectra Generation for Asymmetric Structures Using Random Vibration Techniques," M.P. Mullen et al., 10th International Conference on Structural Mechanics in Reactor Technology, August, 1989.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY
TATANKA RIDGE WIND, LLC FOR A PERMIT FOR A WIND ENERGY FACILITY
IN DEUEL COUNTY, SOUTH DAKOTA, FOR TATANKA RIDGE WIND FARM

SD PUC DOCKET EL _____

PRE-FILED DIRECT TESTIMONY OF JANELLE RIELAND,
WESTERN ECOSYSTEMS TECHNOLOGY, INC.,
ON BEHALF OF TATANKA RIDGE WIND, LLC

June 17, 2019

TABLE OF CONTENTS

I. INTRODUCTION AND QUALIFICATIONS 1

II. PURPOSE OF TESTIMONY 2

III. ENVIRONMENTAL STUDIES AND SURVEYS CONDUCTED BY WEST 3

IV. CONCLUSION 16

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, employer, and business address for the record.

A. My name is Janelle Rieland. I am employed by Western EcoSystems Technology Inc. ("WEST"), and my business address is 7575 Golden Valley Road, Golden Valley, Minnesota 55427.

Q. Briefly describe your educational background.

A. I received a Bachelor of Science degree in 2002 from the University of Minnesota, Twin Cities, with a Major in Fisheries and Wildlife, and a minor in Biology.

Q. Briefly describe your professional experience.

A. I have 15 years of experience in the energy industry, specializing in project permitting; consulting with the U.S. Fish and Wildlife Service ("USFWS") under the Endangered Species Act and Bald and Golden Eagle Protection Act; conducting project reviews under the National Environmental Policy Act; and managing surveys for both terrestrial and aquatic species, including species-specific surveys conducted in accordance with USFWS and state agency protocols. My professional specializations are environmental review focusing on wildlife and endangered species as well as project management.

Q. What is your role with respect to the Tatanka Ridge Wind Project ("Project")?

A. WEST was engaged by Tatanka Ridge Wind, LLC ("Tatanka Ridge") to conduct desktop reviews (i.e., Site Characterization Study, Northern Long-eared Bat Habitat Assessment, and Butterfly Habitat Assessment), avian raptor nest surveys, avian use point-count surveys, and northern long-eared bat (*Myotis septentrionalis*) acoustic presence/probable absence surveys for the Project, which I managed.

Q. Have you attached a resume or CV?

A. Yes, my resume is attached.

Q. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

A. No, I have not.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your direct testimony?

A. The purpose of my direct testimony is to provide information concerning the existing condition of terrestrial and aquatic ecosystems in the area of the proposed Project ("Project Area"); potential impacts of the Project on terrestrial and aquatic ecosystems; and how the Project will avoid, minimize, or mitigate potential impacts.

Q. Which sections of the Application you are sponsoring?

A. I am sponsoring two sections of the Application and the relevant appendices, including:

- Section 9 Terrestrial Ecosystems
- Section 10 Aquatic Ecosystems
- Appendix D Dakota Skipper and Poweshiek Skipperling Survey Report
- Appendix E Protected Species Agency Documentation
- Appendix F Avian Use Report
- Appendix G Eagle and Raptor Nest Survey Reports
- Appendix H Northern Long-eared Bat Habitat Assessments
- Appendix I Northern Long-eared Bat Survey Report
- Appendix J Site Characterization Study

III. ENVIRONMENTAL STUDIES AND SURVEYS CONDUCTED BY WEST

Q. What vegetation is present within the Project Area?

A. As presented in Table 9-1 within the Application, approximately 71 percent of the Project Area is mapped as cultivated crops and 21 percent is mapped as herbaceous (dominated by grass-like species or plants without woody stems). Vegetation within the remaining 8 percent of the Project Area is mapped as developed, hay/pasture, emergent wetlands, and deciduous forest.

A total of 5,874 acres of herbaceous lands are mapped within the Project Area. Herbaceous lands within the Project Area were evaluated using a desktop assessment to identify potentially undisturbed grasslands in the Project Area (intact grassland areas that have either never been tilled, 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). As described in additional detail in Section 9.1.1.1 of the Application, the desktop assessment identified 3,954 acres of herbaceous land within the Project Area that are currently cultivated, planted tree rows, or heavily disturbed livestock corral areas (referred to as Disturbed Grasslands). The remaining 1,920 acres (7 percent of the Project Area) of herbaceous land within the Project Area was classified as potentially undisturbed grasslands.

Areas classified as potentially undisturbed grasslands during the desktop assessment were surveyed in June 2018 (eastern portion of the Project Area) and from late May through

early June 2019 (western portion of the Project Area) in order to determine the quality of the vegetation community and its potential to support federally listed skippers. The results of the grassland surveys, which are described in Section 9.1.1.1 of the Application, determined that 1,906 acres (over 99 percent) are Non-native Undisturbed Grasslands and the remaining 14 acres (less than 1 percent) are Native Undisturbed Grasslands.

Q. How will the Project impact grasslands?

A. A total of 5,899 acres of lands mapped as herbaceous communities are within the area where ground disturbance will occur during Project construction. The Project has been designed to minimize impacts to grasslands to the extent feasible. As a result, no turbines are located within grasslands, and turbines will not be located within 1,383 feet of Native Undisturbed Grasslands. Impacts to grasslands will primarily be limited to the 44.5 acres of Disturbed Grasslands and 15.2 acres of Non-native Undisturbed Grasslands. Impacts from construction of the Project on these low- to moderate-quality grassland communities will be short-term and minor. In addition, collector lines cross 100 feet of Native Undisturbed Grasslands; Tatanka Ridge will minimize ground disturbance within this area and will continue to coordinate with the South Dakota Game, Fish, and Parks to develop measures to minimize impacts to this Native Undisturbed Grassland.

Grassland habitat within the Project Area is highly fragmented, and largely occurs within riparian areas adjacent to waterbodies. As such, additional fragmentation of grassland habitat associated with construction and operation of the Project will be minimal

Q. How will the Project avoid, minimize, or mitigate impacts to vegetation?

A. The Project has been sited to avoid impacts to sensitive vegetation communities to the extent feasible; of the 470.4 acres of vegetation within areas that will be disturbed during construction of the Project, over 87 percent of the impacts will be within cultivated croplands and developed areas.

Forested communities within the Project Area are primarily limited to small woodlots associated with farms and windbreaks. Tatanka Ridge has sited facilities to avoid tree clearing wherever possible; as a result, less than 1 acre of land mapped as forest is within the areas being impacted by construction. Tatanka Ridge will continue to work with the landowners to minimize tree clearing.

Project facilities have been sited to avoid grasslands to the extent feasible. As a result, grasslands impacted by construction of the Project will be limited to 44.5 acres of Disturbed Grasslands, 15.2 acres of Non-native Undisturbed Grasslands, and an approximately 100-foot long collector line crossing of a Native Undisturbed Grassland. If engineering constraints preclude complete avoidance of this Native Undisturbed Grassland, additional minimization measures include limiting vehicle traffic wherever possible in grasslands, replacing soils to follow the original soil profiles in areas where native soils are disturbed, and restoring temporarily disturbed grassland areas based on landowner specifications and/or using a weed-free native plant seed mix, if available. The seed mixes and revegetation plan will be developed as part of the Stormwater Pollution Prevention Plan for the Project.

Q. Have you considered noxious weeds relative to the Project?

A. Yes. Noxious and invasive weeds are regulated at both the state (South Dakota Codified Laws Titles 38–22) and federal (7 Code of Federal Regulations Part 360) level, with the intent being to stop the spread of plants that are detrimental to the environment, crops, livestock, and/or public health. According to the South Dakota Department of Agriculture, a total of 10 noxious weeds are present in Deuel County. Four of these species are designated as State Noxious Weeds and six are designated as Local Noxious Weeds in Deuel County (Table 9-2 in the Application). Two species (musk thistle [*Carduus nutans* – State Noxious Weed] and Canada thistle [*Cirsium arvense* – Local Noxious Weed]) were documented in the Project Area during grassland surveys in June 2018.

Noxious weeds have the potential to spread through a variety of mechanisms. They can be carried on vehicles' undercarriage and tires, and thrive in exposed soil conditions, where they can out-compete native vegetation. Disturbance due to construction has the potential to result in the spread of noxious weeds via work crews, on vehicles, and by introduction to exposed soils from infested areas adjacent to construction activities. 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, if available, following construction.

Q. How did you determine existing use of the Project Area by terrestrial wildlife?

A. Numerous wildlife studies have been completed for the Project between 2009 and 2019, as described in Table 9-3 of the Application. As often occurs during development of a

wind energy project, the Project Area has been modified since wildlife studies began; this occurs due to identification and avoidance of environmental constraints; conformance with federal, state, and local permitting requirements; and landowner requests. Many of the studies used to inform Project design commenced in 2018. Since that time, the Project boundary has been modified, and is both somewhat larger and shifted westward compared to what is described in some of the survey reports appended to the Application.

In accordance with Tiers 1 and 2 of the USFWS Land-Based Wind Energy Guidelines ("WEG"), a Site Characterization Study was conducted utilizing desktop resources to identify potential sensitive species or habitats that could be located within or near the Project. Resources reviewed included, but were not limited to, the USFWS Information for Planning and Consultation and National Wetlands Inventory; US Geological Survey ("USGS") National Land Cover Database, National Hydrography Dataset, Protected Areas Database of the United States, and Breeding Bird Surveys; South Dakota Natural Heritage Database; South Dakota State University's system for identifying potentially undisturbed land; and aerial imagery. Sensitive resources and habitats identified by the Site Characterization Study were assessed in additional detail during subsequent surveys (described below) and taken into consideration during Project design.

To determine the presence, relative abundance, and relative seasonal use of avian species that occur within the Project Area, several surveys were conducted in accordance with Tier 3 of the WEG; Stage 2 of the Eagle Conservation Plan Guidance ("ECPG"); the

federal regulations regarding eagle permits;[1] and USFWS and South Dakota Game, Fish and Parks guidance. Raptor nest surveys were conducted April 10–12, 2018 and April 2–3, 2019, which documented raptor nests of all species within one mile of the Project Area and bald eagle (*Haliaeetus leucocephalus*) nests within 10 miles of the Project Area (Appendix G of the Application). In addition, one year of eagle/avian use point count surveys occurred monthly between April 2018 and March 2019, the results of which are described in Appendix F of the Application. A second year of eagle/avian use point count surveys began in April 2019 and will continue through March 2020.

Acoustic presence/probable absence surveys were conducted for the federally threatened northern long-eared bat in July 2018 (Appendix I of the Application). Due to the change in the Project boundary, northern long-eared bat acoustic presence/probable absence surveys were conducted in one additional location between May 30 and June 6, 2019 (the results of which will be provided to the South Dakota Public Utilities Commission in a supplemental filing when available).

Grassland surveys conducted in June 2018 documented a total of 41.5 acres of potential Dakota Skipper (*Hesperia dacotae*) / Poweshiek skipperling (*Oarisma poweshiek*) Habitat, of which 39.0 acres is within the current Project Area. Adult occupancy surveys were conducted in accordance with the USFWS 2018 Dakota Skipper North Dakota Survey Protocol for the federally threatened Dakota skipper and federally endangered

[1] *See* Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests; Final Rule. 50 Code of Federal Regulations Parts 13 and 22. Department of the Interior, Fish and Wildlife Service. 81 Federal Register 242: 91494–91554. December 16, 2016.

Poweshiek skipperling from June 23 through 28, 2018 (Appendix D of the Application).[2]. Due to the change in the Project boundary, grassland surveys were conducted within 1,920 acres of potentially undisturbed grasslands in the western portion of the Project between May 28 – June 2, 2019. No Dakota Skipper / Poweshiek Skipperling Habitat was documented within the western portion of the Project Area during grassland surveys (the grassland survey report will be provided to the South Dakota Public Utilities Commission in a supplemental filing when available).

Q. Are any federally listed terrestrial species and/or designated critical habitat, or state-listed terrestrial species present within the Project Area?

A. Neither state- nor federally listed terrestrial species have been documented within the Project Area. An IPaC resource list was generated in May 2019 that identified four federally endangered or threatened terrestrial species that are known or expected to occur near the Project: northern long-eared bat; red knot (*Calidris canutus rufa*); Dakota skipper; and Poweshiek skipperling. The closest designated critical habitat to the Project (Dakota skipper and Poweshiek skipperling, South Dakota Unit 2) is approximately three miles south-southeast of the Project in Brookings County. One state-listed terrestrial wildlife species, the northern river otter (*Lontra canadensis*) has been documented within Deuel County. A SDNHD review of the area within two miles of the Project in May 2019 did not contain records of either state- or federally listed terrestrial species within or near the Project. Both the IPaC resource list and SDNHD review of the Project are included in

[2] The USFWS 2018 Dakota Skipper (*Hesperia dacotae*) North Dakota Survey Protocol has been approved by the USFWS for Dakota skipper and Poweshiek skipperling adult occupancy surveys in South Dakota. A letter from the USFWS granting site-specific authorization per condition F.3 of Federal Endangered Species Permit No. TE64070B-1 was provided to Mr. Jake Powell (Senior Ecologist, SWCA) on June 13, 2018, which is included in Appendix D of the Application.

Appendix E of the Application.

As described above (see previous question), species-specific surveys were conducted for the northern long-eared bat in 2018 and 2019, and for the Dakota skipper and Poweshiek skipperling in 2018. Surveys did not document use of the Project Area by federally listed species. As described in Section 9.2.1.4 of the Application, the potential for the red knot (federally listed as threatened) to occur in the Project Area is minimal due to its overall rarity in the region and because suitable stopover habitat is not present. The northern river otter, state-listed as threatened, is not expected to occur within the Project Area because large, slow-moving waterbodies are not present.

Q. Based on the analyses you have described, what are the anticipated Project impacts on wildlife species?

A. The primary impact to terrestrial wildlife that utilize habitat within the Project Area is expected to be short-term displacement to nearby similar habitat due to habitat modification, increased noise levels, and human activity. As discussed in Section 9.2.2.2 of the Application, Tatanka Ridge has sited Project facilities to minimize impacts to high quality habitat and the wildlife species that utilize them. As a result, the Project will impact less than 1 acre of forest, no turbines will be placed within grasslands, the closest Native Undisturbed Grassland is approximately 1,800 feet from a turbine (Turbine B1), and over 90% of the turbines are at least 300 feet from Non-native Undisturbed Grasslands. Given that there is an adequate amount of similar or higher quality in the vicinity of the Project, displacement associated with construction is likely to have temporary and minor impacts to terrestrial wildlife.

Construction of the Project may also result in the direct mortality of some individuals of less mobile wildlife species (e.g., reptiles and amphibians). Because the Project facilities have been sited outside of sensitive habitats and are largely located within cultivated croplands and developed areas (together accounting for over 87 percent of the impacted area), these impacts are expected to be minor and not have population-level effects. Tatanka Ridge will further reduce impacts to wildlife by instructing construction crews to avoid disturbing or harassing wildlife and by removing trash from the Project Area to avoid attracting scavengers or other wildlife to the construction area.

During operation, the primary concern associated with wind energy facilities relates to potential impacts to birds and bats. These species may be directly impacted by the Project either through loss or avoidance of suitable habitat and/or by collision with turbines. As described in Section 9.2.2 of the Application, the Project has been sited and designed to avoid and minimize impacts to birds and bats, and impacts to these species are likely to be similar to other facilities in the region.

Q. Are any impacts to federally listed terrestrial species and/or designated critical habitat, or state-listed terrestrial species anticipated as a result of the Project?

A. No impacts to listed species or designated critical habitat are anticipated as a result of the Project. As discussed in Sections 9.2.2.4 and 9.2.2.5 of the Application, potentially suitable habitat for listed terrestrial species is absent (i.e., red knot and northern river otter) or limited (i.e., northern long-eared bat, Dakota skipper, and Poweshiek skipperling) within the Project Area. Further, species-specific surveys conducted for the

northern long-eared bat (Appendix I of the Application), and federally listed skippers (Appendix D of the Application) were negative. Therefore, impacts on federally and state-listed species are not anticipated. Because the closest designated critical habitat is three miles from the Project Area, no impacts to critical habitat are anticipated from the Project.

Q. Are any impacts to bald or golden eagles anticipated as a result of the Project?

A. Based on the results of eagle nest surveys and avian use point count surveys, use of the Project by both bald and golden eagles (*Aquila chrysaetos*) are expected to be low and no impacts to bald or golden eagles are anticipated as a result of the Project. The closest known bald eagle nest is 5.4 miles southeast of the Project Area (Appendix G of the Application), and only two bald eagles and two golden eagles were observed during the 178 hours of avian use point count surveys conducted between April 2018 and March 2019 (Appendix F of the Application).

Q. What measures will Tatanka Ridge implement to avoid or minimize impacts to wildlife?

A. As described above, the Project has been sited to avoid or minimize impacts to high quality or sensitive habitats (e.g., forest, Native Undisturbed Grasslands, Dakota Skipper/Poweshiek Skipperling Habitat, wetlands), thereby minimizing impacts to terrestrial wildlife that may occur within these habitats. Following construction, temporarily disturbed areas will be regraded to pre-construction conditions 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 or in accordance with landowner requests and as available. Prior to construction, Tatanka Ridge will prepare a

Bird and Bat Conservation Strategy ("BBCS") to be implemented during operation of the Project. The BBCS will include standards for minimizing impacts to avian and bat species during operation of the Project and be consistent with the WEG. It will include a description of commitments to Project siting, construction practices and design standards, operational practices, permit compliance, and construction and operation worker training. These are discussed in greater detail in Section 9.2.2 of the Application.

Q. Are aquatic ecosystems present in the Project Area and, if so, what measures will Tatanka Ridge employ to avoid or minimize potential impacts?

A. Yes. Aquatic resources present in the Project Area are described in detail in Section 8.2.1 of the Application. Based on the USGS National Hydrology Database, USFWS National Wetlands Inventory data, and wetland/waterbody delineations, waterbodies within the Project Area are largely intermittent streams and wetlands are almost exclusively composed of small, freshwater emergent wetlands, the majority of which are within the eastern portion of the Project Area. Given the Project's location in eastern South Dakota, many of the wetlands within the Project are digressional wetlands known as prairie potholes and may be cultivated during dryer periods of the year.

In accordance with the United States Army Corps of Engineers' Nationwide Permit General Condition No. 23, the Project will avoid and minimize adverse impacts to waters of the United States to the maximum extent practicable; avoidance and minimization measures designed to minimize impacts to wetlands and waterbodies will also substantially reduce impacts to wildlife that resides within aquatic ecosystems. Tatanka Ridge has avoided siting turbines in both wetlands and waterbodies. When feasible,

access roads, collection lines, and other Project facilities have been sited in upland areas. Where wetlands and waterbodies must be intersected, Tatanka Ridge will either use a trenchless technique or minimize impacts to Nationwide Permit thresholds to the extent practical (discussed in additional detail in Section 8.2.2 of the Application).

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. The Project will be required to develop and implement a Project-specific Stormwater Pollution Prevention Plan, which will describe Best Management Practices for erosion and sedimentation control. Such measures 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. With the implementation of these measures, impacts to aquatic ecosystems associated with sedimentation or total suspended solids are expected to be minimal.

Q. Are any federally or state-listed aquatic species, or designated critical habitat present within the Project Area?

A. Potentially. There is a moderate likelihood of the federally endangered Topeka shiner occurring within the Project Area. Although this species has not been documented within the Project Area, it has been documented near the Project in Peg Munky Run, North Deer Creek, and Hidewood Creek.

There is moderate potential for the northern redbelly dace (*Chrosomus eos*), a state-threatened species, to occur within the Project Area. The northern redbelly dace was

documented within an unnamed intermittent stream in the southeastern corner of the Project in 2002, and has been documented near the southwestern portion of the Project Area in Peg Munky Run as recently as 2012.

There is very low potential for the banded killifish (*Fundulus diaphanus*), a state-endangered species, to occur in the Project Area. Although it historically occurred in Deuel County, this species has not been documented in the county since 2000.

Q. Are any impacts to federally or state-listed aquatic species, or designated critical habitat anticipated as a result of the Project?

A. No. As described in detail in Section 10.2.1 of the Application, Tatanka Ridge will implement numerous measures to avoid impacts to federally and state-listed aquatic species. Due to the moderate likelihood for waterbodies within the western portion of the Project Area (within the Middle Big Sioux watershed) to contain the federally endangered Topeka shiner, no in-water activities will occur within the Middle Big Sioux watershed. Further, disturbance will not occur within 50 feet of waterbodies where listed species have been documented in or near the Project. If intermittent streams are completely dry at the time of construction activities, crane paths may cross these features. If this occurs, the measures described in the USFWS 2014 *Programmatic Biological Opinion for the Issuance of Selected Nationwide Permits Impacting the Topeka shiner in South Dakota* will be implemented, as follows:

1. Erosion and sediment control measures will be installed, monitored, and maintained.
2. Impacts to both the dry waterbody as well as riparian and grassland habitat will

be minimized to the extent feasible.

3. The site will be restored to pre-disturbance condition.

4. Manual revegetation of all disturbed areas will 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 will be monitored and maintained until the site is permanently stabilized.

5. Revegetated areas will be monitored, and any failures addressed, until the site is permanently stabilized.

6. Livestock and machinery will both be excluded from the site following disturbance until the site is permanently stabilized.

With the implementation of these measures, impacts to the Topeka shiner, northern redbelly dace, and banded killifish due to the Project are not anticipated.

IV. CONCLUSION

Q. Does this conclude your direct testimony?

A. Yes.

Dated this 17th day of June, 2019.

/s/

Janelle Rieland, for TATANKA RIDGE WIND, LLC

JANELLE M. RIELAND
Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, MN 55427

EDUCATION

B.S., University of Minnesota, Twin Cities Campus, 2002
Fisheries and Wildlife

HONORS AND AWARDS

Valedictorian, University of Minnesota, College of Natural Resources, 2002
Undergraduate Research Opportunities Program, 2000
Dean's List, University of Minnesota, 1997 – 2002

PROFESSIONAL EXPERIENCE

2018 – Present	Project Manager/Wildlife Biologist, Western EcoSystems Technology, Inc., Golden Valley, Minnesota
2014 – 2018	Principal Consultant and Biological Group Manager, Environmental Resources Management, Minneapolis, Minnesota
2004 – 2014	Senior Consultant and Biological Group Manager, Natural Resource Group, Minneapolis, Minnesota
2003 – 2004	Sustainable Natural Resource-Based Alternative Enterprises Extension Associate, Mississippi State University – Extension Service, Starkville, Mississippi

SPECIALTY AREAS

Janelle Rieland is a project manager with over 15 years of experience in the energy industry and specializes in project management; conducting project review under the National Environmental Act (NEPA); project permitting under Sections 401 and 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA); consulting with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service under the Endangered Species Act (ESA) and Bald and Golden Eagle Protection Act; and managing threatened and endangered species surveys, wetland and waterbody delineations, cultural resource surveys, and Phase I site assessments.

Janelle has managed and authored numerous environmental impact statements (EIS), environmental assessments (EA), environmental resource reports, habitat conservation plans, and biological survey reports. In addition, Janelle was been a part of presentation team for the Federal Energy Regulatory Commission's Environmental Training Seminars for over five years, where she provided instruction on environmental report preparation and construction compliance to participants from oil and gas industry, consulting firms, federal and state agencies, and non-governmental organizations.

SELECTED PROJECT EXPERIENCE

Avangrid Renewables, Multiple Projects, 2018 to Present, wind energy conversion systems in Minnesota and South Dakota: Project Manager responsible for oversight of ecological studies at the Project pursuant to the USFWS Land-Based Wind Energy Guidelines, Eagle Conservation Plan Guidance, Northern Long-Eared Bat Interim Conference and Planning Guidance; preparation of survey reports; and coordination with the USFWS and state natural resource agencies.

EDF Renewables Development, Inc., Multiple Projects, 2018 to Present, wind energy conversion systems throughout the southern and central portion of the United States: Client Coordinator and Project Manager responsible for NEPA review, oversight of ecological studies, preparation of survey reports, coordination with the USFWS and state natural resource agencies, and primary client point of contact for wind projects WEST is working on throughout the southern and central portion of the United States.

Xcel Energy, Multiple Projects, 2018 to Present, wind energy conversion systems in Minnesota: Project Manager responsible for oversight of ecological studies and coordination with the USFWS and state natural resource agencies.

American Electric Power, Multiple Projects, 2018 to Present, wind energy conversion systems in the upper Midwest: Responsible for overseeing the preparation of a third-party Environmental Assessment for the US Fish and Wildlife Service.

Port Blakely, John Franklin Eddy Forestlands, 2018 to Present, forestry project in Oregon: Project Manager responsible for overseeing the preparation of a third-party Environmental Assessment for the US Fish and Wildlife Service and National Marine Fisheries Service.

Boardwalk Pipeline Partners and Sempra Energy, Permian to Katy Project, 2017 to 2018, 515 miles of natural gas pipeline within Texas: Project Manager responsible for overseeing U.S. Army Corps of Engineers permitting under the CWA and RHA, the development of species-specific conservation measures and consultation with the USFWS under Sections 7 and 10 of the ESA, completing biological and cultural field surveys, and providing guidance to Boardwalk and Sempra during project planning.

Freeport LNG, Liquefaction and Phase II Modification Project, Train 4 Project, 2010 to 2013 and 2015 to 2018, natural gas liquefaction, natural gas pre-treatment, and pipeline facilities near Quintana, Texas: Project Manager responsible for overseeing the preparation of FERC Section 7(c) applications; implementing federal and state agency requirements during construction; completing state and federal agency consultations; and providing direct support to Freeport LNG throughout project planning, construction, and operations.

Boardwalk Pipeline Partners and Sempra Energy, Permian to Katy Project, 2017 to 2018, 515 miles of natural gas pipeline within Texas: Project Manager responsible for overseeing coordination with the U.S. Army Corps of Engineers (USACE) and permitting under Nationwide Permit 12 and Section 10 of the Rivers and Harbors Act; the development of species-specific conservation measures and coordination with the U.S. Fish and Wildlife Service (FWS) relating to Sections 7 and 10 of the ESA, completion of biological and cultural field surveys, and state permit requirements.

Freeport LNG, Train 4 Project, 2015 to 2018, liquefied natural gas export facility near Quintana, Texas: Project Manager responsible for overseeing the preparation of the FERC Section 7(c) Environmental

Report Application; directing and completing state and federal agency consultations; and providing direct support to Freeport LNG during project planning.

Freeport LNG, Freeport LNG Liquefaction Project, 2010 to 2013 and 2015 to 2018, natural gas liquefaction facilities at the existing LNG Terminal and natural gas pre-treatment and ancillary facilities near Quintana, Texas: Project Manager responsible for implementing federal and state agency requirements during construction; directing and completing federal and state agency permit amendments; Deputy Project Manager responsible for coordinating the preparation of the FERC Section 7(c) Environmental Report Application; directing and completing state and federal agency consultations; and providing direct support to Freeport LNG during project planning.

FERC, Environmental Training Seminars, 2013 to 2018, multi-day environmental training program delivered at locations throughout the United States: Presenter at FERC seminars on environmental review and compliance for natural gas facilities.

Magnolia LNG, Magnolia LNG Project, 2013 to 2016, liquefied natural gas export facility near Lake Charles, Louisiana: Project Manager responsible for overseeing the preparation of a FERC third-party EIS, and preparing the Proposed Action, Wildlife, and Threatened and Endangered Species sections of the EIS.

Trunkline LNG Company, LLC, Lake Charles Liquefaction Project, 2012 to 2015, natural gas liquefaction facilities at the existing Trunkline LNG Terminal, approximately 18 miles of natural gas pipeline, and new compressor station in Louisiana: Biological lead responsible for the preparation of the Wildlife and Threatened and Endangered Species sections of the EIS.

ONEOK Sterling III Pipeline, Sterling III Pipeline, 2011 to 2014, 550 miles of 16-inch-diameter natural gas liquids (NGL) pipeline from near Medford, Oklahoma to Mont Belvieu, Texas: Deputy Project Manager and Biological Task Lead responsible for coordination and permitting for the USACE under Nationwide Permit 12 and Section 10 of the Rivers and Harbors Act; for planning and coordinating biological surveys; facilitating the development of species-specific conservation measures and coordination with the FWS relating to Sections 7 and 10 of the ESA and the Migratory Bird Treaty Act; and collaboration with team members to implement project data management tool to facilitate data sharing during routing, survey, and permitting.

El Paso Corporation, Marcellus Ethane Pipeline System Project, 2010 and 2011, abandonment of approximately 850 miles of pipeline currently transporting natural gas from Louisiana to Ohio and the subsequent conversion of the pipeline to transport ethane from Ohio to Louisiana: Project Manager responsible for preparation of a FERC section 7(c) Environmental Report Application; developing permitting and implementation strategies; overseeing environmental field surveys; and providing direct support to El Paso, as needed.

PROFESSIONAL AFFILIATIONS

The Wildlife Society
Minnesota Association of Environmental Professionals