Deuel Harvest Wind Energy South LLC
Application for Energy Facility Permits

Deuel County, South Dakota

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ACRONYMS & ABBREVIATIONS

ACP	American Clean Power
ADLS	Aircraft Detection Lighting System
ADT	Average Daily Traffic
AM	Amplitude Modulation
AMSL	Above Mean Sea Level
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
Application	Facility Permit Application
ARSD	Administrative Rules of South Dakota
BBCS	Bird and Bat Conservation Strategy
BMPs	Best Management Practices
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CO_2	Carbon Dioxide
CUP	Conditional Use Permit
CWA	Clean Water Act
dBA	A-Weighted Decibels
DoD	Department of Defense
ECPG	Eagle Conservation Plan Guidance
ELF	Extremely Low Frequency
EMF	Electric and Magnetic Fields
EPA	United States Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	Frequency Modulation
GE	General Electric
GIA	Generator Interconnection Agreement
GPAs	Game Production Areas
GW	Gigawatt
Hz	Hertz
IBAs	Important Bird Areas
Invenergy	Invenergy LLC
IPaC	Information for Planning and Conservation
kHz	Kilohertz
km	Kilometer
KMZ	Keyhole Markup Language Zip
Ksat	Saturated Hydraulic Conductivity
kV	Kilovolt
kV/m	Kilovolts per Meter
kWh	Kilowatt Hour
L_{90}	Sound level exceeded 90% of the time during a measurement period

L_{eq}	Equivalent-continuous sound level
L_{max}	Maximum sound level
m/s	Meters per Second
MBTA	Migratory Bird Treaty Act
MET	Meteorological
mG	Milligauss
MISO	Midcontinent Independent Transmission System Operator, Inc.
mph	Miles per Hour
MW	Megawatt
MWh	Megawatt Hour
NAAQS	National Ambient Air Quality Standards
NAIP	National Agriculture Imagery Program
NESC	National Electric Safety Code
NEXRAD	Next-Generation Radar
NHIS	Natural Heritage Information System
NLCD	National Land Cover Database
NLEB	Northern Long-Eared Bat
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NTIA	National Telecommunication Information Administration
NWCC	National Wind Coordinating Collaborative
NWI	National Wetland Inventory
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
PGA	Peak Ground Acceleration
PST	Pre-Screening Tool
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SDBWG	South Dakota Bat Working Group
SDCL	South Dakota Codified Laws
SDDENR	South Dakota Department of Environment and Natural Resources
SDDLR	South Dakota Department of Labor and Regulation
SDDOA	South Dakota Department of Agriculture
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Game, Fish, and Parks
SDGS	South Dakota Geological Survey
SDPUC	South Dakota Public Utilities Commission
SG	Siemens Gamesa
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SO_2	Sulfur Dioxide

SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total Maximum Daily Load
U.S.	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
WEG	Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WHO	World Health Organization
WIHA	Walk-In Hunting Area
WMA	Wildlife Management Area
WMD	Wetlands Management District
WNS	White-Nose Syndrome
WPAs	Waterfowl Production Area
WSR-88D	Weather Surveillance Radar model-88 Doppler

1. Introduction

1.1 Project Overview

Deuel Harvest Wind Energy South LLC ("South Deuel Wind") respectfully submits this Facility Permit Application ("Application") to the South Dakota Public Utilities Commission ("SDPUC") for Energy Facility Permits ("Permits") to construct and operate a wind energy facility, as defined under South Dakota Codified Law ("SDCL") 49-41B-2(13), and an associated transmission facility, as defined under SDCL 49-41B-2.1(1), in Deuel County, South Dakota. The wind energy facility will have a nameplate capacity of up to 260 megawatts ("MW") and deliver up to 250 MW to the point of interconnection. The wind energy facility will include up to 68 wind turbines. The transmission facility will operate at 345 kilovolts ("kV") and be approximately 6 miles in length. The wind energy facility and transmission facility are collectively referred to as the South Deuel Wind Project ("Project").

The Project is located in the townships of Blom, Brandt, Clear Lake, Norden, and Scandinavia in Deuel County, South Dakota as shown in Figure 1 in **Appendix A**. The Project will be located on privately-owned land within the 34,339-acre general Project Area ("Project Area"), of which 29,258 acres are leased for the Project. The Project will include the following facilities ("Project Facilities"):

- Up to 68 wind turbines;
- Electrical collection and supervisory control and data acquisition ("SCADA") systems;
- A 34.5 kV to 345 kV collector substation ("Collector Substation");
- An approximately 6-mile long 345 kV generator transmission tie line ("Gen-Tie Line");
- Improvements to enable the interconnection of the Project into the existing 345 kV Astoria interconnection switchyard ("Interconnection Switchyard");
- An operations and maintenance facility ("O&M Facility");
- Access roads;
- Up to three meteorological ("MET") towers;
- Up to two aircraft detection lighting system ("ADLS") towers; and
- Temporary construction areas, including crane paths, public road improvements, a general construction laydown yard, staging areas, and a concrete batch plant, as needed.

The preliminary Project layout ("Project Layout") is shown in Figure 2 in **Appendix A**.

Development of the Project began in 2015 with landowner outreach and the establishment of a local office on Main Street in Clear Lake, South Dakota. Over the past 9 years, South Deuel Wind has performed a thorough suite of environmental studies, engineering analyses, and other development activities to refine the Project. The Project is made possible by a partnership between landowners that are interested in harnessing the area's rich wind resources and South Deuel Wind's development expertise.

In 2023, South Deuel Wind received a Conditional Use Permit ("CUP") for the Project from Deuel County. The Project represents a significant investment in Deuel County that will support the local economy while simultaneously generating clean, renewable energy. The Project is

anticipated to create an estimated 243 new jobs during construction and 8 new jobs during operations for South Dakota. Over the anticipated 30-year operational life of the Project, South Deuel Wind is estimated to generate:

- Over $78 million in payments to landowners and existing agricultural producers.
- Over $38 million in new property tax revenue which will increase funding for schools, roads, and municipal services.
- Over $2.3 million in new induced impacts which will support businesses such as restaurants, gas stations, hotels, grocery stores, etc.

1.2 Summary of Potential Impacts

Approximately 1,058 acres of temporary ground disturbance impact is expected during construction of the Project, approximately 51 acres of which will be long-term for the operational life of the Project (approximately 0.1 percent of the total land within the Project Area) to host aboveground Project Facilities. For reference, there are approximately 253,000 acres of farmland in Deuel County (United States Department of Agriculture ["USDA"], 2024). Due to the dispersed footprint of the Project, existing land uses are not anticipated to be significantly impacted. South Deuel Wind has completed field surveys for 93 percent[1] of the areas that would be temporarily and/or permanently impacted by Project Facilities as proposed in the Project Layout. The information in this Application is based on the results of these surveys. South Deuel Wind will conduct additional field surveys prior to construction, as necessary, to ensure coverage of all areas that will be temporarily and/or permanently impacted by Project Facilities in the final Project layout.

The Project has been sited and designed to avoid or minimize impacts to wetlands and waterways. The aboveground Project Facilities are generally located in cropland and upland areas, avoiding low-lying wetlands and waterways. During final engineering, wetland and waterway impacts will be minimized to the extent practicable and, if necessary, permitted in compliance with the Clean Water Act ("CWA").

Construction of Project Facilities in cropland is not expected to negatively impact terrestrial and aquatic ecosystems. Best Management Practices ("BMPs") will be implemented during construction to avoid or minimize impacts to the vegetation and water resources present in the Project Area. Project Facilities have been sited to avoid impacts to state-owned and federal-managed conservation lands. There is one walk-in hunting area ("WIHA") located on privately-owned property participating in the Project that is anticipated to host Project Facilities. If Project Facilities are constructed on the property, the landowner has advised that the WIHA agreement will be modified or terminated as needed to accommodate the Project.

A Cultural Resource Level I Records Review for the Project Area identified previously recorded archaeological and historic resources located within or near the Project Area. Additionally, a Level III Intensive Cultural Resources Survey as well as a reconnaissance-level Historic Age Architectural Resource Survey were completed. Project Facilities have been sited to avoid

[1] Approximately 75 acres that would be temporarily and/or permanently impacted by Project Facilities as proposed in the Project Layout have not yet been field surveyed. Requisite surveys for any impacted areas will be completed prior to construction.

impacts to sites identified as potentially eligible for listing on the National Register of Historic Places ("NRHP").

Noise from construction activities will be temporary. In accordance with the Deuel County Zoning Ordinance, noise from the Project during operations will be limited to 45 dBA at the perimeter of existing non-participating residences.

Additional impact avoidance and minimization measures planned for the Project include:

- The Project will not exceed 30 hours of shadow flicker per year at existing residences;
- The Project will meet or exceed setbacks, conditions, and siting standards required by state and local governing bodies;
- The Project will employ an ADLS, as required per SDCL 49-41B-25.2 as authorized by the Federal Aviation Administration ("FAA"), to minimize illumination of red lights;
- The Project will locate access roads to minimize grading activities and utilize existing roads and field paths for access where practicable;
- The Project will reseed uncultivated areas temporarily disturbed during construction to blend with existing vegetation;
- The Project will avoid or minimize impacts to potentially unbroken grasslands; and
- The Project will utilize BMPs during construction to control erosion and prevent or minimize impacts to wetlands, waterways, and drainageways in accordance with the Project's Storm Water Pollution Prevention Plan ("SWPPP").

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

> ***ARSD 20:10:22:06. Names of participants required.*** *The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.*
>
> ***ARSD 20:10:22:07. Name of owner and manager.*** *The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.*

Deuel Harvest Wind Energy South LLC, a subsidiary of Invenergy Wind Development North America LLC and an affiliate of Invenergy LLC ("Invenergy"), is currently the entity anticipated to own and operate the Project. As a privately held company with a 20+ year track record of responsibly developing, building, owning and operating wind, solar, energy storage, and natural gas generation facilities, Invenergy has developed more than 200 projects and 32 gigawatts of generating capacity in the Americas, Europe, and Asia. Invenergy is also developing transmission projects to build a more robust, resilient grid.

South Deuel Wind, provided it receives Permits from the SDPUC, may directly or indirectly through its affiliates, own, construct, and operate the Project by selling the power using long term power purchase agreements or other available options. Alternatively, South Deuel Wind may sell or assign the Project, or a portion thereof, to one or more public utilities or other

qualified entity or entities at any time. Any future buyer or assignee will be required to meet all permit conditions and any power purchase agreement obligations associated with the Project or portion thereof. As part of any such sale or assignment, South Deuel Wind or an affiliate may function as the engineering, procurement, and construction contractor to construct the Project and/or function as the operations and maintenance ("O&M") services provider to operate and maintain the Project.

Monica Monterrosa is the primary contact for the Project. Contact information for the individuals authorized to receive communications relating to the Application on behalf of Deuel Harvest Wind Energy South LLC is provided in **Table 1.3**.

Table 1.3 Contact Information	
Aidan O'Connor Manager, Renewable Development Invenergy LLC One South Wacker Drive, Suite 1800 Chicago, IL 60606 (312) 429-2593 aoconnor@invenergy.com	Monica Monterrosa Director, Renewable Development Invenergy LLC One South Wacker Drive, Suite 1800 Chicago, IL 60606 (312) 508-8743 mmonterrosa@invenergy.com
Lisa Agrimonti Attorney Fredrikson & Byron, P.A. 200 South 6th Street, Suite 4000 Minneapolis, MN 55402 (612) 492-7000 lagrimonti@fredlaw.com	Michael Iacopetti Associate, Renewable Development Invenergy LLC One South Wacker Drive, Suite 1800 Chicago, IL 60606 (708) 523-0049 miacopetti@invenergy.com
Haley Waller Pitts Attorney Fredrikson & Byron, P.A. 200 South 6th Street, Suite 4000 Minneapolis, MN 55402 (612) 492-7000 hwallerpitts@fredlaw.com	

1.4 Application Content and Organization

In accordance with SDCL Ch. 49-41B and the Administrative Rules of South Dakota ("ARSD") Ch. 20:10:22, this Application provides information on the existing environment; potential Project impacts; and proposed avoidance, minimization, and/or mitigation measures for the following resources:

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

- Communities (socioeconomics, cultural resources, and transportation).

In this Application, South Deuel Wind has addressed each matter set forth in SDCL Ch. 49-41B and ARSD Ch. 20:10:22 related to wind energy and transmission facilities. **Table 1.4.1** provides a Completeness Checklist that identifies where each rule requirement is addressed in the Application.

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

1. The facility complies 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 to the views of governing bodies of affected local units of government.

In 2023, South Deuel Wind received a CUP for the Project from Deuel County. Because South Deuel Wind has a CUP, the requirement that a project not threaten the social and economic condition of inhabitants or expected inhabitants in the siting area has been met. SDCL 49-41B-22(2). The CUP also satisfies the fourth requirement, that a project not unduly interfere with the orderly development of the region. SDCL 49-41B-22(4). The CUP, associated findings, and the Wind Energy System section of the Deuel County Zoning Ordinance ("Ordinance") are provided in **Appendix B.**

1.4.1 Completeness Checklist

The contents required for an application with the SDPUC are described in SDCL 49-41B and further clarified in ARSD 20:10:22:01 (1) et seq. The SDPUC's submittal requirements are listed in **Table 1.4.1** with cross-references identifying where each rule requirement is addressed in the Application.

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(1) thru (12)	20:10:22:05	**Application contents**. The application for a permit for a facility shall contain the applicable information specified in §§ 20:10:22:06 to 20:10:22:25, inclusive, 20:10:22:36, and 20:10:22:39. If the application is for a permit for an energy conversion facility, it shall also contain the information specified in §§ 20:10:22:26 to 20:10:22:33, inclusive. If the application is for a permit for a transmission facility as defined in SDCL subdivision 49-41B-2.1(1), it shall also contain the information in §§ 20:10:22:34 and 20:10:22:35. If the application is for a permit for a transmission facility as defined in SDCL subdivision 49-41B-2.1(2), it shall also contain the information in §§ 20:10:22:37 and 20:10:22:38. If the application is for a permit for a wind energy facility, it shall also contain the information in §§ 20:10:22:33.01 and 20:10:22:33.02. 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.	Sections 1.0 through 24.0
49-41B-11(1)	20:10:22:06	**Names of participants required**. The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	Section 1.3
49-41B-11(7)	20:10:22:07	**Name of owner and manager.** The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	Section 1.3
49-41B-11(8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	Section 2.0

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(12)	20:10:22:09	**Estimated cost of facility**. The applicant shall describe the estimated construction cost of the proposed facility	Section 3.0
49-41B-11(9)	20:10:22:10	**Demand for facility.** The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	Section 2.0
49-41B-11(2)	20:10:22:11	**General site description.** The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	Section 4.0 and Figures 1, 2, 3, 9, and 14 in **Appendix A**
49-41B-11(6); 49-41B-21; 34A-9-7(4)	20:10:22:12	**Alternative sites.** The applicant shall present information related to its selection of the proposed site for the facility, including the following: (1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria; (2) An evaluation of alternative sites considered by the applicant for the facility; (3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	Section 5.0
49-41B-1(2,11); 49-41B-21; 49-41B-22	20:10:22:13	**Environmental information.** The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of	Sections 6.0, 7.0, 8.0, 9.0, 10.0, 13.0, 14.0, and 15.0

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
		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.	
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:14	**Effect on physical environment**. The applicant shall provide information describing the effect of the proposed facility on the physical environment. The information shall include: (1) A written description of the regional land forms surrounding the proposed plant or wind energy site or through which the transmission facility will pass; (2) A topographic map of the plant, wind energy, or transmission site; (3) A written summary of the geological features of the plant, wind energy, or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area; (4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plant, wind energy, or transmission site; (5) A description of the soil type at the plant, wind energy, or transmission site; (6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control; (7) Information on areas of seismic risks, subsidence potential and slope instability for the plant, wind energy, or transmission site; and	Section 7.0; Figures 2, 5, 6, 7, 8, and 13 in **Appendix A**.

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
		(8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a description of plans to offset such constraints.	
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:15	**Hydrology.** The applicant shall provide information concerning the hydrology in the area of the proposed plant, wind energy, or transmission site and the effect of the proposed site on surface and groundwater. The information shall include: (1) A map drawn to scale of the plant, wind energy, or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility; (2) Using plans filed with any local, state, or federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects; (3) A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission; (4) If aquifers are to be used as a source of potable water supply or process water, specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of groundwater; (5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; and (6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.	Section 8.0 and Figure 9 in **Appendix A**.

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:16	**Effect on terrestrial ecosystems.** The applicant shall provide information on the effect of the proposed facility on the terrestrial ecosystems, including existing information resulting from biological surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected within the transmission site, wind energy site, or siting area; an analysis of the impact of construction and operation of the proposed facility on the terrestrial biotic environment, including breeding times and places and pathways of migration; important species; and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 9.0; Figures 8, 10, 11, and 12 in **Appendix A**; Appendices F, G, H, I, J, K, L
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:17	**Effect on aquatic ecosystems.** The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, wind energy site, or siting area, an analysis of the impact of the construction and operation of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 10.0; **Appendix E**
49-41B-11(2,11); 49-41B-22	20:10:22:18	**Land use.** The applicant shall provide the following information concerning present and anticipated use or condition of the land: (1) A map or maps drawn to scale of the plant, wind energy, or transmission site identifying existing land use according to the following classification system: (a) Land used primarily for row and nonrow crops in rotation; (b) Irrigated lands; (c) Pasturelands and rangelands; (d) Haylands; (e) Undisturbed native grasslands; (f) Existing and potential extractive nonrenewable resources; (g) Other major industries; (h) Rural residences and farmsteads, family farms, and ranches; (i) Residential;	Sections 11.0 and 15.2; Figures 12, 13, and 14 in **Appendix A**

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
		(j) Public, commercial, and institutional use; (k) Municipal water supply and water sources for organized rural water systems; and (l) Noise sensitive land uses; (2) Identification of the number of persons and homes which will be displaced by the location of the proposed facility; (3) An analysis of the compatibility of the proposed facility with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming; and (4) A general analysis of the effects of the proposed facility and associated facilities on land uses and the planned measures to ameliorate adverse impacts.	
49-41B-11(2,11); 49-41B-28	20:10:22:19	**Local land use controls.** The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should preempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	Section 12.0; **Appendix B**
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:20	**Water quality.** The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Sections 8.0 and 13.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:21	**Air quality.** The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Section 14.0

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(3)	20:10:22:22	**Time schedule.** The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.	Section 4.4.1
49-41B-11(4, 10, 11); 49-41B-22	20:10:22:23	**Community impact.** The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility will have on the anticipated affected area including the following: (1) A forecast of the impact on commercial and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities or services; (2) A forecast of the immediate and long-range impact of property and other taxes of the affected taxing jurisdictions; (3) A forecast of the impact on agricultural production and uses; (4) A forecast of the impact on population, income, occupational distribution, and integration and cohesion of communities; (5) A forecast of the impact on transportation facilities; (6) A forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance. The information shall include the applicant's plans to coordinate with the local and state office of disaster services in the event of accidental release of contaminants from the proposed facility; and (7) An indication of means of ameliorating negative social impact of the facility development.	Section 15.0; **Appendices C, T, U, V, W, X**
49-41B-11(4)	20:10:22:24	**Employment estimates.** The application shall contain the estimated number of jobs and a description of job classifications, together with the estimated annual employment expenditures of the applicants, the contractors, and the subcontractors during the construction phase of the proposed facility. In a separate tabulation, the application shall contain the same data with respect to the operating life of the proposed facility, to be made for the first ten years of	Sections 15.1.2.1 and 16.0

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
		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.	
49-41B-11(5)	20:10:22:25	**Future additions and modifications.** The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	Section 17.0
49-41B-35(3)	20:10:22:33.01	**Decommissioning of wind energy facilities.** Funding for removal of facilities. The applicant shall provide a plan regarding the action to be taken upon the decommissioning and removal of the wind energy facilities. Estimates of monetary costs and the site condition after decommissioning shall be included in the plan. The commission may require a bond, guarantee, insurance, or other requirement to provide funding for the decommissioning and removal of a wind energy facility. The commission shall consider the size of the facility, the location of the facility, and the financial condition of the applicant when determining whether to require some type of funding. The same criteria shall be used to determine the amount of any required funding.	Section 18.0 and **Appendix X**
49-41B-11(2,11)	20:10:22:33.02	**Information concerning wind energy facilities.** If a wind energy facility is proposed, the applicant shall provide the following information: (1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color; (2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years; (3) Any warning lighting requirements for the wind turbines;	Sections 4.2, 4.3, 4.4, 5.0, 9.1.2, 11.3, 11.6, 19.1, 19.3, and 20.0

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
		(4) Setback distances from off-site buildings, rights-of-way of public roads, and property lines; (5) Anticipated noise levels at the exterior of all occupied residences located within the affected area 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 underground connection facilities are placed, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	
49-41B-11	20:10:22:34	**Transmission facility layout and construction.** If a transmission facility is proposed, the applicant shall submit a policy statement concerning the route clearing, construction and landscaping operations, and a description of plans for continued right-of-way maintenance, including stabilization and weed control.	Sections 4.2.10, 4.5, 9.1.2, 19.2, and 21.0; Figure 3 in **Appendix A**
49-41B-11(2,11)	20:10:22:35	**Information concerning transmission facilities.** If a transmission facility is proposed, the applicant shall provide the following information: (1) Configuration of the towers and poles, including material, overall height, and width; (2) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower;	Sections 4.2.10, 4.3, 4.5, 5.0, 9.1.2, 19.2, 19.3, and 21.0; Figures

Table 1.4.1 Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
		(3) The proposed transmission site and major alternatives as depicted on overhead photographs and land use culture maps; (4) Reliability and safety; (5) ROW or condemnation requirements; (6) Necessary clearing activities; and (7) If the transmission facility is placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	2 and 3 in **Appendix A**
49-41B-7; 49-41B-22	20:10:22:36	**Additional information in application.** The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.	Section 22.0
49-41B-22	20:10:22:36	**Applicant's burden of proof.** The applicant has the burden of proof to establish that: (1) The proposed facility will comply with all applicable laws and rules; (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area; (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.	Section 22.4
49-41B-11	20:10:22:39	**Testimony and exhibits.** Upon the filing of an application pursuant to SDCL 49-41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application.	Section 23.0

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

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

ARSD 20:10:22:10. Demand for facility. *The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.*

The purpose of the Project is to generate electricity to supply the needs of entities that have an interest in procuring renewable energy. South Deuel Wind is actively submitting bids for power purchase agreements through various utility, commercial, and industrial opportunities. The electricity generated by the Project will be transmitted onto the grid operated by Midcontinent Independent System Operator, Inc. ("MISO"), where it will contribute to meeting electricity demand across the MISO service territory. Due to the nature of grid operations, it is not possible to trace electricity to its exact delivery point or final usage. By supplying zero-emission electricity to the grid, the Project will offer both environmental benefits and price stability. Further discussion on the demand for this energy and its associated benefits is provided in Section 2.1.

2.1 Renewable Energy Demand

The 2023 Lazard Levelized Cost of Energy Analysis provides a comprehensive examination of the levelized costs associated with all types of electricity production, including both renewable and non-renewable energy sources. Based on this analysis, production of electricity from wind energy is one of the most cost-effective options, making it an attractive investment for utility companies and large consumers of electricity. Construction of new wind energy generation facilities is more affordable than new non-renewable energy generation facilities, even without tax credit programs. **Table 2.1** provides a comparison of the unsubsidized levelized cost of energy for both renewable and non-renewable energy generation facilities. Overall, renewable energy generation facilities can provide lower costs per megawatt hour ("MWh") of electricity than non-renewable energy generation facilities.

Table 2.1 Unsubsidized Levelized Cost of Energy		
Energy Source	**Generation Type**	**Levelized Cost ($/MWh)**
Renewable	Wind	$24 - $75
	Solar Photovoltaic	$24 - $96
Non-Renewable	Coal	$68 - $166
	Gas Combined Cycle	$39 - $101
	Gas Peaking	$115 - $221
	Nuclear	$141 - $221

Source: 2023 Lazard Levelized Cost of Energy Analysis – Version 16.0

2.1.1 National Demand

In 2022, the total amount of electricity consumed in the United States was approximately 4.07 trillion kilowatt hours ("kWh"), the highest amount recorded and 14 times greater than electricity use in 1950 (USEIA, 2023a). In its Annual Energy Outlook 2022, the United States Energy Information Administration ("USEIA") estimated that the annual growth in total United States ("U.S.") electricity demand will increase 1% annually from 2022 through 2050.

In March 2015, the United States Department of Energy ("USDOE") released its Wind Vision Report which assessed the technical feasibility of using wind energy to generate 20%, or approximately 224 gigawatts ("GW"), of the nation's electricity demand by 2030 and 35%, or approximately 404 GW, by 2050. As of 2023, the total amount of wind energy capacity in the U.S. was approximately 150 GW (American Clean Power ["ACP"], 2024). The projected benefits associated with achieving the Wind Vision targets are:

- Avoidance of 250,000 metric tons of air pollution and a reduction of 12.3 gigatons of greenhouse gas emissions;
- Preservation of 260 billion gallons of water;
- Enhancement of U.S. energy security through diversification of its electricity portfolio;
- Reduced energy costs to consumers yielding $280 billion in savings;
- Creation of new income for rural landowners and tax revenues for local communities, reaching $3.2 billion annually; and
- Creation of 600,000 well-paying jobs in manufacturing, installation, and maintenance and supporting services (USDOE, 2015).

In addition to the outlined benefits, demand for renewable energy from wind is high due to relatively low costs, increases in capacity, continued availability of production tax credits, state renewable portfolio standards, and corporate demand for renewable energy (USDOE, 2022). Most, if not all, of regional power producers' resource plans call for increasing the use of fixed-cost resources, such as wind energy, with zero fuel cost, pollution, and carbon emissions as a necessity to provide cost-effective electricity to their customers. Utility, industrial, and commercial customers are signing long-term power purchase agreements with wind energy facilities and/or purchasing wind energy facilities outright to decrease their exposure to volatile fuel prices, thus stabilizing prices for consumers.

Wind energy generation is replacing aging coal and nuclear facilities that are being retired for regulatory and financial reasons. U.S. coal-fired generation capacity is projected to decline to

approximately 50% of current levels by 2030, with continued gradual decline thereafter (USEIA, 2023b). Similarly, nuclear generation capacity is experiencing more retirements than new construction, with nearly 19 GW of nuclear generation capacity expected to be retired by 2050 (USEIA, 2021). By contrast, even the USEIA's most modest projections forecast wind energy generation capacity to grow by over 195 GW by 2050 (USEIA, 2023b). Wind energy generation is an inexhaustible source of clean electricity that can help effectively address the identified capacity deficit while avoiding the emission of particulate matter, heavy metals, and greenhouse gases caused by non-renewable combustion-based energy generation.

2.1.2 Regional and State Demand

In addition to national resource planning trends, the MISO regional transmission system has specifically been identified as an area with "immediate need for generation investment" as fossil fuel capacity is retired. In 2023, power producers in the MISO region had plans to retire more than 1,800 MW of coal generation capacity (Bennett & Duquiatan, 2023). Looking forward, power producers in the region have formally announced intent to retire an additional 7,700 MW by the end of 2025 (USEIA, 2024).

South Dakota has some of the nation's greatest wind resources, corroborated by the 55 percent in-state net generation rate provided by wind energy (USEIA, 2023c). The Project site in particular boasts an abundance of wind resources, enabling significant energy production with no fuel costs. Electricity generated by the Project can be sold at more competitive prices compared to other forms of energy projects that rely on purchasing fuel for generation. This translates to cost-effective electricity for power purchasers and energy customers within the MISO service territory.

Once online, the Project will deliver up to 250 MW of electrical capacity to the MISO regional transmission system, which will be distributed and used to service electrical demand in the MISO service territory. South Deuel Wind is actively marketing the sale of electricity from the Project to utility, commercial, and industrial customers. Local utilities have expressed interest in acquiring renewable electricity generation in the area. Specifically, Minnesota Power, a regional utility, has outlined plans to procure 400 MW of wind energy capacity by 2037. Minnesota Power's decision to cease coal operations at the Boswell Energy Center by 2030 underscores their need for sources of renewable energy.

2.1.3 Local Benefits

The Project will provide numerous local and regional economic benefits. The Project Area is largely dependent on an agricultural-based economy. Agricultural economies are sensitive to commodity prices and weather, among other variables. Because only a small portion of the land under lease will be used to host aboveground Project Facilities, agricultural operations in the Project Area will be able to continue largely undisturbed.

Wind energy facilities provide consistent payments to existing farm operations, increase local tax revenue, and create job opportunities during both the short-term construction and the long-term operational phases. In addition to the employees directly involved in the construction and operation of the Project, numerous other jobs are created through indirect supply chain purchases, services required, and the higher spending that is induced by employees and

landowners. Local businesses, such as restaurants, grocery stores, hotels, and gas stations, will see increased business from construction workers. Local industrial businesses, including aggregate and cement suppliers, welding and industrial suppliers, hardware stores, automotive and heavy equipment repair, electrical contractors, and maintenance providers will also likely benefit from construction of the Project.

The Project is anticipated to create approximately 243 new jobs during construction and 8 new jobs during operations for South Dakota. Over the anticipated 30-year operational life of the Project, South Deuel Wind is estimated to generate:

- Over $78 million in payments to landowners and existing agricultural producers.
- Over $38 million in new property tax revenue which will increase funding for schools, roads, and municipal services.
- Over $2.3 million in new induced impacts which will support businesses such as restaurants, gas stations, hotels, grocery stores, etc.

The anticipated economic benefits to be produced by the Project are discussed at length in Section 15.1.2 of the Application and the Economic Impact Analysis provided in **Appendix C**.

2.2 Consequences of Delay

As established in Sections 2.1.1 and 2.1.2, there is demand for the renewable energy that the Project will supply. Delays will increase the Project's exposure to fluctuations in equipment and contractor pricing, which may increase construction costs. Additionally, the development terms in the Project's lease agreements are susceptible to expiration, jeopardizing the necessary property rights to site the Project. Furthermore, environmental and engineering studies may become outdated, necessitating duplicative efforts. Finally, South Deuel Wind's Generator Interconnection Agreement ("GIA") will be, and Deuel County CUP is subject to expiry, adding further need to adhere to the Project schedule. Delay will also postpone the addition of carbon-free generation and the significant local economic benefits identified in Section 2.1.3.

3. Estimated Cost of the Facility (ARSD 20:10:22:09)

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

The current estimated capital cost of the Project is approximately $621 million based on indicative construction and wind turbine pricing cost estimates. This estimate includes lease acquisition, permitting, engineering, financing, procurement, and construction of the Project Facilities.

4. General Site and Facility Descriptions (ARSD 20:10:22:11, 20:10:22:33:02)

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

4.1 Project Area

The Project is located in the townships of Blom, Brandt, Clear Lake, Norden, and Scandinavia in Deuel County, South Dakota as shown in Figure 1 in **Appendix A**. The Project will be located on privately-owned land within the 48,730-acre general Project Area, of which 29,258 acres are leased for the Project. **Table 4.1** lists the county, townships, ranges, and sections within the Project Area.

Table 4.1 Project Area

County Name	Township Name	Township	Range	Sections
Deuel	Clear Lake	115N	49W	33
	Clear Lake	115N	48W	32
	Brandt	114N	49W	1-5, 7-17, 20-29, 36
	Norden	114N	48W	2-35
	Blom	113N	49W	1
	Scandinavia	113N	48W	1-5, 10-15, 22-24
	Scandinavia	113N	47W	7

4.2 Project Description

The Project will have a nameplate capacity of up to 260 MW and deliver up to 250 MW to the point of interconnection. The Project will include the following Project Facilities:

- Up to 68 wind turbines;
- Electrical collection and SCADA systems;
- A 34.5 kV to 345 kV Collector Substation;
- An approximately 6-mile long 345 kV Gen-Tie Line;
- Improvements to enable the interconnection of the Project into the existing 345 kV Astoria Interconnection Switchyard;
- An O&M Facility;
- Access roads;
- Up to three MET towers;
- Up to two ADLS towers; and
- Temporary construction areas, including crane paths, public road improvements, a general construction laydown yard, staging areas, and a concrete batch plant, as needed.

The preliminary Project Layout is shown in Figure 2 in **Appendix A**.

South Deuel Wind has performed a thorough suite of environmental studies, engineering analyses, and other development activities to refine the Project. The Project has been sited to avoid or minimize potential impacts. As will further be addressed later in this Application, the final Project layout will account for a variety of interrelated factors. For example, unforeseen circumstances may arise just before or during construction that may require a turbine location to be slightly adjusted. For these reasons, South Deuel Wind respectfully requests that the Permit allow turbines to be shifted within 250 feet of their currently proposed locations, so long as they are located on leased land, specified noise and shadow flicker thresholds are not exceeded, county siting standards are complied with, cultural resource impacts and documented habitats for listed species are avoided, and wetland impacts are avoided or are in compliance with applicable United States Army Corps of Engineers ("USACE") regulations. If turbine shifts are greater than 250 feet, exceed the noted thresholds, or do not meet the other limitations specified, South Deuel Wind will either use an alternate turbine location or obtain SDPUC approval for the proposed turbine location change.

Adjustments to the location of transmission structures for the Gen-Tie Line may also be necessary. Therefore, South Deuel Wind respectfully requests that the Permit allow Gen-Tie Line transmission structures to be shifted within the 150-foot-wide Gen-Tie Line right-of-way ("ROW") as needed, so long as the transmission structures are located on leased land, cultural resources are avoided or mitigated in consultation with the South Dakota State Historic Preservation Office ("SHPO"); wetland impacts are avoided or are in compliance with applicable USACE regulations; and all other applicable regulations and requirements are met.

Adjustments to the location of the electrical collection and SCADA systems, Collector Substation, O&M Facility, access roads, MET towers, ADLS towers, and temporary construction areas may also be necessary. Therefore, South Deuel Wind respectfully requests that the Permit allow the location of these facilities to be adjusted, as needed, so long as they are located on leased land, cultural resources are avoided or mitigated in consultation with the SHPO; documented habitats for listed species are avoided; wetland impacts are avoided or are in compliance with applicable USACE regulations; and all other applicable regulations and requirements are met.

4.2.1 Turbine Models

The Project Layout shown in Figure 2 in **Appendix A** identifies 73 proposed turbine locations, of which up to 68 will be constructed depending on the nameplate capacity(s) of the turbine model(s) procured. Final turbine model selections must account for various factors, including some factors that are beyond the ability of South Deuel Wind to control. Such factors include, among others, turbine availability, advancements in turbine technology, and permitting timelines. South Deuel Wind developed this Application with a set of proposed turbine locations that can accommodate the turbine models identified in **Table 4.2.1**[2]. Turbine locations were sited in

[2] All 73 proposed turbine locations in the Project Layout were modeled for noise and shadow flicker. Turbine locations 69 and 76 can only support the General Electric ("GE") 3.8-154 turbines due to shadow flicker requirements. However, these locations could accommodate Siemens Gamesa ("SG") & Vestas turbines depending on the final turbine locations used for construction and mitigation methods implemented during operations. All other proposed turbine locations within the Project Layout can accommodate all turbine models identified in Table 4.2.1.

accordance with industry-standard spacing. South Deuel Wind will coordinate with original equipment manufacturers ("OEM") to conduct mechanical loads analyses and will ensure that all final turbine locations are deemed suitable. South Deuel Wind respectfully requests that the Permit allow for the use of turbine models of comparable capacity and specifications, provided county siting standards are complied with and the conditions specified in the Permit can be complied with.

Table 4.2.1 Turbine Models and Specifications

Turbine Model	Nameplate Capacity (MW)	Hub Height		Rotor Diameter		Tip Height	
		Feet	Meters	Feet	Meters	Feet	Meters
General Electric 3.8-154	3.8	322	98	505	154	574	175
Siemens Gamesa 4.4-164	4.4	320	97.5	538	164	589	180
Vestas 163-4.5	4.5	322	98	535	163	589	180

4.2.2 Turbine Foundations

South Deuel Wind plans to use a spread footing foundation design for the turbines. Foundation size will vary based on turbine model and will have a depth of up to 12 feet. Except for approximately 12 inches that will remain aboveground to allow turbine towers to be bolted to the foundations, the foundations will be underground. Turbine foundations will be constructed from concrete and rebar to support the turbine structures. The final foundation designs will be engineered for the specific turbine model, soils, and subsurface conditions at each turbine location and stamped by a registered professional engineer.

4.2.3 Turbine Towers

Turbine towers will be self-supporting, tubular steel towers connected to turbine foundations by anchor bolts. The towers will be painted a non-glare white, off-white, or gray to comply with FAA regulations. Access to the turbines will be through a lockable steel door at the base of each tower. Within the tower, access to the nacelle will be provided by a ladder connecting platforms and equipped with a fall-arresting safety system. Each turbine structure is estimated to have a 25-foot radius long-term ground disturbance impact. In total, 3.3 acres of long-term ground disturbance impact is anticipated to site turbine structures.

4.2.4 Turbine Nacelles

Turbine nacelles will house the main mechanical components that transform the wind's kinetic energy into electricity. The nacelle will be connected to the tower by a yaw system. Motors power rotation of the yaw drive assembly which consists of a machine base frame mounted on a roller or sliding bearing that's attached to the tower via a bolted yaw ring. The rotation of the yaw drive allows for the turbine to be oriented into the direction of the wind to maximize energy production.

The main components inside the nacelles are the main shaft, gearbox, and generator. Mechanical and/or ultrasonic anemometers and weathervanes will be externally mounted at the rear of the nacelle to provide real-time wind speed and direction data to the controller. Based on the data

collected, the turbine yaw system constantly rotates the nacelle, hub, and blades into the wind, while the blade pitch system continuously adjusts the pitch of the blades to optimize the output of the generator based on wind speeds. The gearbox adjusts shaft speed to maintain generator speed in low and high wind speeds.

4.2.5 Turbine Hubs

Turbine hubs will connect the three rotor blades to the main shaft. The hubs will be mounted directly to the main shaft and house three electrically actuated hydraulic blade pitch systems. In addition to optimizing the output of the generator, the pitch systems act as the main braking system for the turbines. Braking under normal operating conditions will be accomplished by pitching the blades perpendicular to the wind. The turbine control system will automatically adjust the pitch of the blades and brake as necessary in high wind conditions. A back-up power system ensures the blades can be pitched in the event of grid loss. The control system will also alert the turbine when the wind is strong enough to begin turning the generator and producing electricity at the "cut-in" wind speed. The turbines will also be equipped with a mechanical brake located at the output shaft of the gearbox to stop the hub's rotation in the event of a storm, fault, or maintenance.

4.2.6 Turbine Rotor Blades

Turbine rotor blades will be connected to the hub and capture kinetic energy from the wind. The rotor blades will be non-metallic and equipped with a sophisticated lightning protection system designed to conduct lighting from the receptors at the tip of each blade, down through the blade, hub, tower, and then finally dissipated via the earthing insulation system incorporated into the foundation.

4.2.7 Turbine Transformers

Electricity produced by the generators will be routed through insulated cables in the power rail to a safety switch then to a transformer which will increase the voltage to 34.5 kV. The transformer may be located internally to the turbine towers or externally at the base of the towers. External transformers will require a small, concrete slab foundation within the gravel area at the turbine base for support. The exact dimensions of the transformers and concrete slab will depend on transformer manufacturer specifications and site-specific engineering requirements. After the voltage of the electricity is increased to 34.5 kV, it will be fed into the electrical collection system.

4.2.8 Electrical Collection and SCADA Systems

Electricity will be routed from the turbine transformers to the Collector Substation through an electrical collection system that aggregates the electricity of groups of turbines. The electrical collection system will be comprised of underground collector circuits and aboveground junction boxes as required for connections or splices. The electrical collection system will be designed for operation at 34.5 kV and terminate at the Collector Substation.

Approximately 56.5 miles of underground collector circuits will be installed, depending on the final Project Layout. The footprint of an aboveground junction box, including a gravel pad and bollards, will be up to 20 by 15 feet. In total, 0.35 acres of long-term ground disturbance impact

is estimated to site aboveground junction boxes associated with the electrical collection system. A preliminary electrical collection system layout is provided in Figure 2 in **Appendix A**.

The Project will be monitored by a SCADA system that will provide telemetry, control, and communication among the turbines, Collector Substation, Gen-Tie Line, O&M building, ADLS, and transmission system enabling the Project to be monitored in real time by technicians as well as staff at a 24/7 off-site operations facility. The SCADA system will utilize fiber optic cables that will primarily be installed concurrently with the electrical collection system.

4.2.9 Collector Substation

The Collector Substation will increase the voltage from the electrical collection system to that of the transmission system at the point of interconnection (345 kV). The Collector Substation will include two 34.5 kV to 345 kV main power transformers, a transformer containment area, control enclosure, overhead bus and associated structures, circuit breakers, disconnect switches, relay panels, surge arresters, battery banks, grounding system, and relaying, metering, and communication equipment. Fencing around the Collector Substation will likely be a chain link design 7 feet high topped with 1 foot of barbed wire to comply with the National Electric Safety Code ("NESC"). The Collector Substation is estimated to have three acres of long-term ground disturbance impact. A preliminary Collector Substation location is provided in Figure 2 in **Appendix A**.

4.2.10 Gen-Tie Line

The Gen-Tie Line will transmit electricity approximately 6 miles from the Collector Substation to the point of interconnection at the Interconnection Switchyard. The Gen-Tie Line will be an overhead 345 kV transmission line of a three-phase, single-circuit, monopole design. The conductor will be sized to carry the electricity of the Project, and to meet any thermal stability, vibration resistance, or other specific technical criteria required. Fiber optic cable will run the length of the Gen-Tie Line for communications. The Gen-Tie Line will require a 150-foot-wide ROW. A preliminary Gen-Tie Line route is provided in Figure 2 in **Appendix A**.

Tangent transmission structures will be approximately 80 to 135 feet tall and turning and dead-end transmission structures will be approximately 90 to 150 feet tall. The transmission structures will be single pole or H-frame structures, likely made of weathered steel. Transmission structures will be placed approximately 900 feet apart with conductors approximately 25 to 30 feet above ground level, meeting applicable NESC requirements. Transmission structures will utilize a delta or vertical cross-arm configuration. Transmission structures will either be secured using concrete foundations or directly embedded and backfilled with crushed rock or native soils. Transmission structures that are considered medium angle, heavy angle, or dead-end structures will have concrete foundations. Tangent and light angle structures may be placed on poured concrete foundations or directly embedded. Each directly embedded transmission structure will have approximately 30 to 40 square feet of long-term ground disturbance impact. Each concrete foundation for a transmission structure will have approximately 50 to 110 square feet of long-term ground disturbance impact. In total, the Gen-Tie Line transmission structures are estimated to have less than 0.1 acres of long-term ground disturbance impact. Typical transmission structure designs are provided in Figure 3 in **Appendix A**.

4.2.11 Interconnection Switchyard

The existing Astoria 345 kV Interconnection Switchyard owned by Otter Tail Power Company will serve as point of interconnection between the Project and the MISO regional transmission system. South Deuel Wind anticipates executing a GIA with Otter Tail Power Company and MISO in the second half of 2024. The extent of physical work to be completed by South Deuel Wind to accommodate the interconnection of the Project will be determined at GIA execution.

4.2.12 O&M Facility

The O&M Facility will include an O&M building, parking lot, storage area, and other associated facilities such as a drinking water well, aboveground water storage tanks, septic system, security gate, security system, lighting, and signage. The O&M building will house administrative and maintenance equipment and personnel. The O&M building will be the main working base for the Project's technicians and house the Project's control system hardware that provides real time data to technicians and staff at a 24/7 off-site operations facility. The O&M building will have workstations for the technicians to use to organize their days in the field, and a garage with tools and an inventory of parts and maintenance supplies. Fencing around the O&M storage area will likely be a chain link design 7 feet high topped with 1 foot of barbed wire. Security cameras will be installed at the O&M building. Doors to the O&M building and gates to the O&M storage area will be secured using a key control or badge reader system. The O&M Facility is estimated to have 2.5 acres of long-term ground disturbance impact. A preliminary O&M Facility location is provided in Figure 2 in **Appendix A**.

4.2.13 Access Roads

Where practicable, existing public roads, private roads, and field paths will be utilized to access the Project. Existing roads may require improvements before, during, or after construction. Where necessary, new access roads will be constructed and maintained to facilitate year-round access to the Project. Access roads connected to turbines will be all-weather, gravel surfaced, and approximately 16 feet wide. Access roads connected to the Collector Substation and O&M Facility will be approximately 24 feet wide. Access roads connected to MET towers and ADLS towers will be approximately 10 feet wide. Total access road length across the entire Project is estimated to be approximately 21.8 miles. In total, 42.4 acres of long-term ground disturbance impact is estimated to site access roads. Preliminary access road locations are provided in Figure 2 in **Appendix A**.

4.2.14 MET Towers

Up to three MET towers may be installed to acquire wind data to confirm turbine performance. The MET towers will be self-supporting with heights not to exceed the hub height of the turbines. MET towers will be marked and lit as specified by the FAA. Final MET tower locations will depend on the final location of the turbines and specifications of the turbine manufacturer and financing parties. In total, less than 0.1 acres of long-term ground disturbance impact is estimated to site MET towers. Preliminary MET tower locations are provided in Figure 2 in **Appendix A**.

4.2.15 ADLS Towers

The Project will comply with FAA marking and lighting standards to promote aviation safety. Turbine nacelles will be equipped with red lights to provide nighttime visibility to pilots. If approved by the FAA, an ADLS will be installed to minimize illumination time of the lights. An ADLS is an automated radar-based system that monitors airspace and activates lighting when an aircraft is detected at or below 1,000 feet above turbine tip height and approaching within 3 miles of a turbine location. When an aircraft exits the detection zone, the ADLS will turn the lights off. South Deuel Wind will work with the FAA to seek to implement an ADLS that is compliant with SDCL 49-41B-25.2.

ADLS towers are up to 200 feet tall and are equipped with a Doppler X-band radar mounted to the top of the tower. The size of the tower and its foundation design will depend on the tower location and proximal topography. An outdoor cabinet containing ADLS equipment will be located at the base of the tower. The ADLS will be powered by the nearest turbine or local distribution line; a generator may be installed for back-up power. If the system is shut down due to an event such as a power outage, turbine lighting will switch to default operational mode, which involves regular lighting per FAA requirements. Equipment at the base of the ADLS towers will be enclosed by fencing, with a footprint of approximately 25 by 35 feet. In total, less than 0.1 acres of long-term ground disturbance impact is estimated to site two ADLS towers. A preliminary ADLS tower location is provided in Figure 2 in **Appendix A**.

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

South Deuel Wind has entered into long-term, voluntary lease and easement agreements for the placement of Project Facilities with private landowners within the Project Area that provide for a total operating period of 50 years. South Deuel Wind has not requested, nor will it seek to utilize, eminent domain powers to acquire easements for the Project. Private land and public road ROW will be used for all Project Facilities.

4.4 Wind Energy Facility Construction, Restoration, and Operation and Maintenance Procedures (ARSD 20:10:22:22)

ARSD 20:10:22:22. Time schedule. *The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.*

4.4.1 Construction Schedule

Construction of the Project is planned to begin in summer 2025 and be completed by the end of 2026, pending successful completion of permitting, agency approvals, and other development and pre-construction activities. **Table 4.4.1** identifies the preliminary construction schedule for the Project. The construction schedule may be impacted by events outside of South Deuel Wind's control, such as unanticipated issues with equipment procurement, contracting, weather, or other scheduling factors.

Table 4.4.1 Preliminary Construction Schedule		
Activity	**Start**	**End**
Start of Construction	September 2025	
Site Preparation	September 2025	November 2025
Access Roads	September 2025	December 2025
Turbine Foundations	October 2025	May 2026
Electrical Collection System	March 2026	October 2026
Turbine Deliveries	April 2026	July 2026
Turbine Installation	May 2026	August 2026
Turbine Wiring	May 2026	September 2026
Mechanical Completion	June 2026	October 2026
Backfeed	July 2026	
Commissioning	August 2026	November 2026
Substantial Completion	November 2026	November 2026
Commercial Operations	December 2026	

4.4.2 Mobilization and Site Preparation

The first step in construction will be to survey, stake, and prepare workspaces for clearing. Erosion control measures will be installed in accordance with the Project's SWPPP and applicable permit conditions. Environmentally sensitive areas will be marked off using colored flagging or tape to signify them as avoidance areas. Workspaces will then be cleared and graded, as necessary to provide construction access and the safe movement of equipment and personnel.

An approximately 20-acre temporary general construction laydown yard will be developed and include construction trailers with administrative offices, employee parking, water service, power service, tool sheds, storage containers, and a laydown area for equipment and material delivery and storage. The general construction laydown yard may also include a temporary concrete batch plant to prepare foundations on-site. Following completion of construction, the temporary general construction laydown yard will be restored by removing the gravel and geotextile fabric (if installed), decompacting the subsoil, replacing the stored topsoil, and seeding in accordance with landowner or local agency requests. A preliminary temporary general construction laydown yard location is provided in Figure 2 in **Appendix A**.

Appropriate safety measures will be implemented before excavation begins, including notification through the South Dakota One-Call system to ensure third-party utilities are properly marked. During construction activities, dust control measures will be conducted in accordance with the Road Use Agreement currently in negotiation with Deuel County to manage dust along roads, the general construction laydown yard, and other construction workspaces.

Water and sanitary facilities will be established to support the construction crews on site. Water will be provided from off-site facilities, and sanitary facilities will be provided in the form of portable latrines. Some construction workspaces and the general construction laydown yard will be fenced as needed to prevent access by wildlife or unauthorized personnel.

4.4.3 Access Roads, Crane Paths, and Public Roads

Access roads will be constructed to connect the Project to public roadways. Access roads will be utilized to access each turbine location, the Collector Substation, O&M Facility, MET towers, and ADLS towers. During construction, access roads may need to be temporarily widened to approximately 40 feet to accommodate transportation of the turbine erection crane and other large construction equipment.

Access roads will be constructed by first removing a layer of topsoil and organic material and storing the topsoil. The subgrade will then be compacted and constructed according to civil design requirements. Subgrade work will likely include cement stabilization or other treatments as needed to create a suitable base such as geotextile fabric and compacted aggregate base course material. Temporary culverts and field approaches will be installed where needed to maintain adequate access and drainage during construction. In total, 106.1 acres of temporary ground disturbance impact is estimated during construction to site access roads. Following completion of construction, the temporary portions of access roads will be restored by removing the gravel, decompacting the subsoil, replacing the stored topsoil, and seeding in accordance with landowner or local agency requests.

Large construction cranes will be utilized to erect the turbines. Temporary crane paths approximately 75 feet wide on participating land will be utilized between turbine locations to facilitate cross-country movement of the turbine erection cranes. Where cranes are required to travel across sensitive areas (soft ground, roads, pipelines), cribbing, bedding, or mats will be placed to support the weight of the crane, minimizing impacts to the underlying ground. The cribbing, bedding, or mats will be removed immediately following passage of the crane, to be re-used ahead of the crane or elsewhere in the Project Area. Total crane path length is estimated to be approximately 21.9 miles. In total, 199.4 acres of temporary ground disturbance impact is estimated during construction to facilitate movement of turbine erection cranes. Following completion of construction, crane paths will be restored by decompacting the soil and seeding in accordance with landowner or local agency requests.

Public roads may require improvements to allow for the safe and efficient access of trailers carrying turbine components and construction equipment to the Project Area. South Deuel Wind is in the process of identifying the optimal haul route to the Project Area and where existing road improvements may be required. Final haul routes will be selected in consultation with the Deuel County Road Department. South Deuel Wind will work with the appropriate federal, state, and/or local agencies as necessary to obtain the permits required for these improvements.

4.4.4 Turbines

South Deuel Wind will initiate the construction of the turbines by clearing, removing, and stockpiling the topsoil and subsoil at each turbine site. Topsoil and subsoil will be stored separately in a semicircle around the turbine foundations. Turbine foundations will be constructed by excavating an approximately 100-foot-diameter hole, placing reinforcing steel and pouring concrete into the excavation. Next, the subsoil will be replaced over most of the concrete foundation followed by the topsoil, leaving only the pedestal of the foundation above surface grade.

South Deuel Wind will clear, grade, and develop an up to 250-foot radius construction workspace around each turbine site, including a 100 by 100-foot crane pad area extending from the access road to the turbine location that will be used to erect the turbine. In total, 329 acres of temporary ground disturbance impact is estimated during construction for installation of the turbine structures. The construction workspace will be used to lay down turbine components and maneuver the turbine erection crane during turbine assembly. Turbine components will be transported to the Project Area by semi-truck and then assembled by the turbine erection crane. The typical assembly process includes the following steps:

1. The tower sections are assembled and bolted to the foundation.
2. The hub and nacelle are mounted on the yaw ring attached to the top tower section.
3. The rotor blades are connected to the hub via anchor bolts, then connected to the main shaft protruding from the nacelle.

Each turbine will require approximately 4 to 5 days to erect. Once installed, South Deuel Wind will mark and light the turbines to comply with FAA requirements. Following completion of construction, the temporary construction workspace around each turbine will be restored by decompacting the subsoil, replacing the topsoil, and seeding in accordance with landowner or local agency requests.

4.4.5 Electrical Collection and SCADA Systems

To install the electrical collection and SCADA systems, South Deuel Wind will trench, plow, or where needed, directionally bore the collector circuits and fiber optic cables underground. Directional boring will be used in locations where circuits and cables cross wetlands, waterways, and sensitive environmental features. Trenching and plowing are anticipated to be the primary methods of installation. Where trenching is appropriate, topsoil and subsoil will be excavated and segregated prior to installation. In total, 320 acres of temporary ground disturbance impact is estimated during construction for installation of the electrical collection and SCADA systems. After installation, subsoil will be backfilled followed by topsoil to preserve soil stratification and continued agricultural use, as appropriate. Collector circuits will be installed at least 48 inches below ground surface and buried with marking tape and tracer wire. South Deuel Wind will register the appropriate underground facilities with the South Dakota One-Call system.

4.4.6 Collector Substation

The Collector Substation will require civil and grading work to prepare for construction and create positive drainage for the facility. Grounding, conduit, foundations, and base aggregate will be installed prior to above-ground construction of bus work and installation of major electrical equipment. All associated safety, electrical, and controls equipment will be installed using applicable utility standards. Pre-operational testing will begin once the system(s) are energized. Once the Project is fully operational, all systems will be rechecked and final site civil work completed. During construction, 4.4 acres of temporary ground disturbance impact is estimated for installation of the Collector Substation.

4.4.7 O&M Facility

The O&M Facility will require civil and grading work to prepare for construction and create positive drainage for the facility. Construction of the O&M building will be similar to that of a

small-scale commercial building, adhering to the same building codes and safety regulations. Gravel aggregate will be installed to create the O&M storage area, which will house the equipment necessary to operate and maintain the Project. A drinking water well and septic system will be installed. During construction, 5 acres of temporary ground disturbance impact is estimated for installation of the O&M Facility.

4.4.8 MET Towers

MET towers will be erected using a crane and bolted to 10 by 10-foot concrete foundations. A 150-foot radius temporary construction workspace will be required for installation of each MET tower. In total, 4.9 acres of temporary ground disturbance impact during construction is estimated to install three MET towers. MET towers will comply with all FAA Marking & Lighting requirements.

4.4.9 ADLS Towers

ADLS towers will be erected using a crane, depending on the final height of the towers. Foundation sizing will depend on the final height of the towers. A 150-foot radius temporary construction workspace will be required for installation of each ADLS tower. In total, 3.2 acres of temporary ground disturbance impact during construction is estimated to install two ADLS towers. A validation aircraft will be flown after installation to confirm design performance and operational safety of the ADLS.

4.4.10 Restoration Procedures

Following completion of construction, all temporary construction workspaces will be cleaned up and restored to pre-construction conditions pursuant to the lease and easement agreements. Construction workspaces will be restored by removing gravel (where applicable unless the landowner requests the gravel remain), decompacting the subsoil, and replacing stored topsoil. Where necessary, temporary and permanent stabilization measures will be implemented, including mulching, seeding with an appropriate seed mix, and installing slope breakers. Erosion control practices will be maintained until disturbed areas are stabilized.

4.4.11 Operation and Maintenance Procedures

South Deuel Wind will manage operations and maintenance of the Project. The Project will have a full-time staff of technicians, a facility manager, and other personnel as necessary. On-site operations and maintenance activities include routine inspections, regular preventive maintenance, and unscheduled maintenance and repair to Project Facilities.

All major components of turbines will undergo routine maintenance in accordance with the schedules established by the OEM. Examples of such activities include lubrication filter replacements, gear oil changeouts, adding coolant, greasing, and applying paints or coatings for corrosion control. Over the life of a turbine, some mechanical components may also require repair or replacement.

Other operations and maintenance activities include snow removal, regrading, and gravel replacement on access roads, routine electrical inspections, and the application of herbicides to control noxious and invasive weeds. South Deuel Wind will also conduct routine preventative

maintenance testing of on-site emergency power generators and maintain fuel levels of on-site propane and fuel tanks.

As described in Section 4.2.8, the Project will be monitored by a SCADA system that will provide telemetry, control, and communication among the turbines, Collector Substation, Gen-Tie Line, O&M building, ADLS, and transmission system enabling the Project to be monitored in real time by technicians as well as by staff at a 24/7 off-site operations facility. O&M staff will be on-site during normal working hours to monitor operations and conduct maintenance activities. South Deuel Wind will communicate regularly with local first response agencies and coordinate training meetings in accordance with the Project's Emergency Response Plan ("ERP") once established. Should any aspect of the Project construction or operations present unfamiliar situations for first responders, South Deuel Wind will arrange for adequate professional training to address those concerns.

4.5 Transmission Facility Construction, Restoration, and Operation and Maintenance Procedures (20:10:22:34)

ARSD 20:10:22:34. Transmission Facility Layout and Construction. *If a transmission facility is proposed, the applicant shall submit a policy statement concerning the route clearing, construction and landscaping operations, and a description of plans for continued right-of-way maintenance, including stabilization and weed control.*

4.5.1 Mobilization and Site Preparation

Construction of an overhead transmission line generally follows a sequence of pre-construction surveying, ROW clearing, mat placement (if necessary), foundation installation, structure assembly and erection, conductor and shield wire installation, ground rod installation, and site restoration and demobilization.

Surveyors will stake the construction ROW and transmission structure locations in preparation for the construction crew. Erosion control measures will be installed in accordance with the Project's SWPPP and applicable permit conditions. Environmentally sensitive areas will be marked off using colored flagging or tape to signify them as avoidance areas. Workspaces will then be cleared and graded, as necessary, to provide for construction access and safe movement of equipment and personnel. Temporary culverts and field approaches will be installed where needed to access the construction workspace and to maintain adequate access and drainage during construction. Appropriate safety measures will be implemented before excavation begins, including notification through the South Dakota One-Call system to ensure third-party utilities are properly marked.

Water and sanitary facilities will be established to support the construction crews on site. Water will be provided from off-site facilities, and sanitary facilities will be provided in the form of portable latrines. Some construction workspaces and the general construction laydown yard may be fenced as needed to prevent access by wildlife or unauthorized personnel.

4.5.2 Gen-Tie Line Construction Procedures

Transmission structures are generally designed for installation at existing grades. Typically, structure sites with 10% or less slope will not be graded or leveled. Sites with more than 10%

slope will have working areas graded level or fill brought in for working pads. South Deuel Wind anticipates that only minimal grading will be required for the Gen-Tie Line because the ROW has very little elevation change. Where grading is required, topsoil will be removed and stored for replacement after construction is complete. Construction mats may be placed in wet or soft soil locations and in narrow ditches to minimize disturbance.

The general construction laydown yard required for construction of the wind energy facility will be shared with the transmission facility. Transmission structures will be delivered to staging areas, sorted, and loaded onto structure trailers for delivery to the staked locations. When it is time to install the structures, the structures will be delivered to the staked location and placed within the Gen-Tie Line ROW until the structure is set. Insulators and other hardware will be attached while the structure is on the ground.

Transmission structures will either be secured using concrete foundations or directly embedded and backfilled with crushed rock or native soils. Transmission structures that are considered medium angle, heavy angle, or dead-end structures will have concrete foundations. Concrete foundation installation involves excavating and placing temporary steel casing, rebar, concrete and anchor bolt cages. The base of concrete foundations typically projects 1 to 2 feet above surface grade. Tangent and light angle structures may be placed on poured concrete foundations or directly embedded. Direct embedding involves drilling or digging a hole for each structure, filling the hole partially with crushed rock, and then setting the structure on the top of the rock base. The area around the structure is then backfilled with crushed rock or soil once the structure is set. Any excess soil from the excavation will be spread and leveled near the structure. Foundations may vary from approximately 3 to 8 feet in diameter and 20 to 30 feet or more in depth, both dimensions will depend on soil conditions observed during final geotechnical investigation.

For the medium angle, heavy angle, and dead-end structures, after the concrete foundation is set and properly cured, the structure will be assembled on the ground, erected, and then bolted to the foundation. For larger structures, the bottom section is bolted to the foundation independently and the upper structures are attached from the top down using a crane. For tangent and light angle structures, if the structure is placed on a poured concrete foundation assembly and erection will follow the same process as medium angle, heavy angle, and dead-end structures. If the structure is directly embedded, the structure will be assembled on the ground then installed into the hole prepared for the structure.

Conductor and shield wire installation will require temporary access to each structure to secure and string the wires between structures. Temporary guard or clearance structures will be installed as needed over existing distribution or communication lines, roads, waterways, or other obstructions after the necessary notifications are made or permits obtained. This effort will protect the wires from damage and ensure that installation will not obstruct traffic or contact existing energized distribution conductor or other overhead cable. Access to the Gen-Tie Line ROW will be made directly from existing roads that run parallel or perpendicular to the ROW. In some situations, private field roads may be used. In all cases where construction traffic and activities are within close proximity to state, county, or local roadways, the construction contractor will coordinate with the governing body on traffic control and safety measures.

Approximately 50 feet of the 150-foot Gen-Tie Line ROW width is anticipated to be temporarily disturbed during construction. The entire Gen-Tie Line ROW width may be temporarily disturbed in select locations for structure setting, stringing areas, and vegetation clearing. Any vegetation inconsistent with the safe and reliable construction, operation, and maintenance of the Gen-Tie Line will be removed and will not be allowed to revegetate. In total, 66.2 acres of temporary ground disturbance impact is expected to install the Gen-Tie Line.

4.5.3 Gen-Tie Line Restoration Procedures

During construction, crews will limit ground disturbance wherever possible. However, areas will be disturbed during the normal course of work. South Deuel Wind will take steps to lessen the impact of the Gen-Tie Line on the surrounding environment by restoring areas disturbed by construction in accordance with BMPs and the Project's permit conditions. Following completion of construction, all temporary construction workspaces will be cleaned up and restored to pre-construction conditions pursuant to the lease and easement agreements. Construction workspaces will be restored by decompacting the subsoil and replacing stored topsoil, where applicable. Where necessary, temporary and permanent stabilization measures will be implemented, including mulching, seeding with an appropriate seed mix, and installing slope breakers. Erosion control practices will be maintained until disturbed areas stabilized. Provided that the Gen-Tie Line ROW is on lands predominately used for row crop agriculture, following construction of the Gen-Tie Line, landowners will be able to continue use of their land in accordance with their land management programs to the extent that it does not interfere with Project operations.

4.5.4 Gen-Tie Line Operation and Maintenance Procedures

Transmission lines are designed to operate for decades and typically require minimal maintenance. The transmission facility may remain in use or be repurposed after the operational life of the wind energy facility. Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent.

Inspections will be conducted to ensure that the Gen-Tie Line is fully functional and in compliance with utility best practice prescribed clearances. During operation, vegetation in the Gen-Tie Line ROW will be maintained to avoid interference with the conductors, allow for ground-based inspection, and enable access to the transmission structures when maintenance is required. Vegetation management may include activities such as tree pruning, tree removal, mowing, and mastication. Herbicides will be used to control noxious and invasive weeds as required. Agricultural land uses will be allowed to resume post-construction around the structures.

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

ARSD 20:10:22:12. Alternative sites. *The applicant shall present information related to its selection of the proposed site for the facility, including the following:*
(1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria;
(2) An evaluation of alternative sites considered by the applicant for the facility;
(3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.

Development of a wind energy facility is an iterative process that involves site identification, project area refinement, and micro-siting of project infrastructure. Wind energy facilities must be located in an area where landowners are willing to grant leases and easements on commercially reasonable terms and conditions and where land use provides sufficient space for optimum turbine spacing. Additionally, access to electric transmission must be available so that the power generated by the facility can be delivered to the grid. The following sections describe the criteria that were considered in determining the development potential of the site, identifying the appropriate Project Area to develop, and designing the Project Layout within the Project Area.

5.1 Project Area Selection

Invenergy began conducting feasibility studies in 2015 to identify wind energy facility sites in South Dakota within the MISO service territory. Initial studies included a desktop review of environmental resources and any potentially sensitive areas and looking for wind energy facility sites in South Dakota that could connect to the then-under-construction Big Stone to Brookings 345 kV transmission line. With that initial information, Invenergy's knowledge of other wind developments in the region, and after working closely and gauging interest with local landowners and stakeholders, the project areas for the Deuel Harvest Wind Farm (*see* SDPUC Docket No. EL18-053) and the South Deuel Wind Project were identified. In 2019, the Deuel Harvest Wind Farm began construction which was completed in 2021. During construction of the Deuel Harvest Wind Farm, Invenergy continued to evaluate the South Deuel Wind project area and develop the Project.

The South Deuel Wind Project Area was primarily driven by:

- Available wind energy resource;
- Access to transmission infrastructure suitable for interconnection;
- Land use and environmental compatibility with wind energy development; and
- Landowner and community support for wind energy development.

5.1.1 Wind Resource

A strong wind resource is key for development of a competitive, economically viable wind energy facility. To obtain an accurate representation of the wind resource within the Project Area, South Deuel Wind performed a comprehensive analysis incorporating the following data:

- Onsite data collected at 3 MET towers;
- Long-term correlation from European Centre for Medium-Range Weather Forecasts' fifth generation atmospheric reanalysis of the global climate (ERA-5);
- Project Area topographic and land cover data;
- 73 proposed turbine locations;
- Turbine locations from operational wind energy facilities in the area and respective turbine technology power curves;
- Power curves from OEMs for the turbine models under consideration; and
- State and county standards.

Results of the wind resource analysis determined the Project Area to have a strong wind resource suitable for the Project. Wind resources in the Project Area surpass those of an average site in the upper Great Plains, giving the Project a competitive advantage in the region. Areas with an annual average wind speed of approximately 6.5 meters per second ("m/s") and over 80 meters in height are typically considered to be ideal for wind energy development. According to the National Renewable Energy Laboratory ("NREL"), wind resources within the Project's region range from 7.0 to 9.0 m/s at a 100-meter hub height, making it a highly favorable wind resource for economical, sustainable, and reliable production of power (NREL, 2023). The proposed hub heights of the turbine models under consideration for the Project are well positioned to capitalize on the anticipated wind resource.

5.1.2 Interconnection

Access to transmission infrastructure suitable for interconnection and market access is critical for the development of a wind energy facility. The existing Astoria 345 kV Interconnection Switchyard located within the Project Area will provide direct access to the MISO regional transmission system minimizing the interconnection infrastructure required to interconnect the Project. Based on the Project's property rights, the approximately 6-mile-long proposed Gen-Tie Line route is the most direct and feasible path between the Collector Substation and the Interconnection Switchyard. All landowners hosting the Gen-Tie Line have been consulted regarding the route and concur with its location.

5.1.3 Land Use and Environmental Compatibility

The Project Area was selected following a review of regional land use and environmental constraints. The Project is compatible with the existing primarily agricultural land uses in the Project Area. Wind energy facilities are particularly compatible with agricultural land because crops can be grown, and livestock can graze, up to the turbines, transmission structures, and other aboveground Project Facilities. Wind energy facilities enable agricultural operators to diversify their operations with minimal disruption to existing agricultural uses. Likewise, agricultural operations are generally compatible with the Gen-Tie Line.

Once the initial site had been selected, the Project Area was refined over time, based on landowner and local government interest, as well as considerations for avoidance of sensitive environmental resources based on consultations with federal and state agencies. South Deuel Wind has voluntarily followed the United States Fish and Wildlife Service ("USFWS") Land-Based Wind Energy Guidelines ("WEG"; USFWS 2012) and the USFWS Region 6 Wildlife

Buffer Recommendations for Wind Energy Projects (USFWS 2020a) to minimize risks to species of concern.

5.1.4 Public Outreach and Communication

South Deuel Wind recognizes the importance of community outreach and engagement in the siting and development process. South Deuel Wind's outreach efforts have included: meeting with landowners, state and federal agencies, local governments, and the general public to discuss the Project. Through these engagements, South Deuel Wind has solicited and incorporated feedback into the Project's design, permitting, construction, and operation plans. Below is a summary of public outreach efforts since 2015.

- Landowners: Project representatives have been meeting with area landowners on both an individual and group basis to discuss the Project since 2015. Participating landowners have received welcome packets, update mailings, and notification letters since joining the Project.
- State and Federal Agencies: Project representatives have held consultations with staff from the SDPUC, USFWS, South Dakota State Historical Society, SHPO, and South Dakota Game, Fish, and Parks ("SDGFP") to discuss the Project. Further details regarding South Deuel Wind's agency coordination are provided in Section 22.2.
- Local Governments: Project representatives have given presentations to the Deuel County Commissioners and Board of Adjustment and engaged with many members of county and town staff to discuss the Project.
- Local Stakeholders: Project representatives have held meetings and discussed the Project with the Watertown Rotary Club, Lake Cochrane Improvement Association, Lake Alice representatives, Deuel Area Development, Inc., Deuel County Agricultural Development, Deuel County Community Foundation, and Interstate Telecommunications Cooperative, Inc.
- State Stakeholders: Project representatives have held meetings and discussed the Project with State Representative Fred Deustch (District 4), State Representative Stephanie Sauder (District 4), State Senator John Wiik (District 4), as well as Jesse Fonkert, Adam Molseed, and Curtis Egan of the South Dakota Governor's Office of Economic Development.
- Online: South Deuel Wind maintains a website (https://deuelwind.invenergy.com/) to provide additional information about the Project and create another opportunity for members of the public to contact the Project.

South Deuel Wind is committed to delivering community-centered benefits. During the development of the Project, this commitment has been demonstrated through multiple initiatives: sponsoring the Crystal Springs Rodeo from 2017 to 2023, participating as a member of the Deuel Area Development, Inc. in 2016, supporting the Deuel County Community Foundation from 2016 to 2019 and in 2022 to 2023 through various donations and functions, participating as a member of the South Dakota Farm Bureau in 2017 and 2018, and supporting the Clear Lake All Schools Reunion in 2022 and 2024. Additionally, Invenergy has consistently donated $30,000 annually to the Invenergy Deuel School Scholarship Fund in 2021-2024, totaling $120,000 to date. South Deuel Wind will continue to engage with the Deuel County community throughout construction and operation of the Project and will donate an additional $25,000 annually during the operation of the Project.

5.2 Site Configuration Alternatives

The Project Layout includes 73 proposed turbine locations, of which at most 68 will be constructed. The Project Layout reflects an optimal configuration for a competitive Project within the Project Area, while avoiding or minimizing impacts to residences, cultural resources, wetlands, waterways, grasslands, and sensitive species and their habitats.

Applicable state and county siting requirements for wind energy facilities are provided in **Table 5.2**. Setbacks are measured from the center point of the turbine. All proposed turbine locations comply with state and county requirements. The buildable area for turbines, after incorporating the siting requirements in **Table 5.2** as well as additional siting constraints, is visually depicted on the turbine siting constraints map provided in Figure 4 in **Appendix A**. After all siting requirements in **Table 5.2** are applied, only 9.2% of the land leased for the Project remains available to site turbines.

Table 5.2 Siting Requirements	
Type	**Requirements**
State Requirements	
Setbacks[3]	Turbines shall be set back at least 500 feet or 1.1 times the height of the tower, whichever is greater, from any surrounding property line, unless the owner of the wind turbine tower has a written agreement with an adjacent landowner allowing the placement of the tower closer to the property line.
County Requirements	
Setbacks[4]	1. 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 1,500 feet. Non-participating property owners shall have the right to waive the respective setback requirements. 2. 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. 3. 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. 4. Distance from the Lake Park District located at Lake Cochrane is at least 3 miles, from Lake Alice at least 2 miles and 1 mile from the Lake Park District at Bullhead Lake. 5. Distance from the municipalities of Altamont, Astoria, Brandt and Goodwin of 1 mile from the nearest residence and 1.5 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.
Noise[5]	Noise level shall not exceed 45 dBA average A-weighted sound pressure at the perimeter of existing residences, for non-participating residences.
Shadow Flicker[6]	Limit for allowable shadow flicker at existing residences to no more than 30 hours annually.

5.3 Lack of Reliance on Eminent Domain

South Deuel Wind has entered into long-term, voluntary lease and easement agreements for the placement of Project Facilities with private landowners within the Project Area that provide for a total operating period of 50 years. South Deuel Wind has not requested, nor will seek to utilize, eminent domain powers to acquire easements for the Project. Private land and public road ROW

[3] Per SDCL 43-13-24
[4] Per Deuel County Zoning Ordinance § 1215.03(2)
[5] Per Deuel County Zoning Ordinance § 1215.03(13)(a)
[6] Per Deuel County Zoning Ordinance § 1215.03(13)(b)

will be used for all Project Facilities. As a result, selection of an alternative site would not reduce reliance on eminent domain powers.

6. Environmental Information (ARSD 20:10:22:13)

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

Sections 7 through 11 and Sections 13 through 15 provide descriptions of the existing environment at the time of Application submittal and the potential changes to the existing environment that are anticipated to result from the construction and operation of the Project. These sections also identify the impact avoidance, minimization, and mitigation measures that will be implemented for the Project. The long-term impacts of the Project will not result in irretrievable land, because the land will be restored to its existing condition to the extent practicable following decommissioning of the Project.

Two operating wind energy facilities are in proximity to the Project Area as shown in Figure 1 in **Appendix A**:

- The Deuel Harvest Wind Farm is a 300 MW wind energy facility located approximately 6 miles north of the Project Area. The Deuel Harvest Wind Farm consists of 109 turbines and commenced operation in February 2021.
- The Tatanka Ridge Wind Farm is a 154.8 MW wind energy facility located adjacent to the Project Area to the southwest. The Tatanka Ridge Wind Farm consists of 56 turbines and commenced operation in January 2021.

The Project, in combination with the Deuel Harvest and Tatanka Ridge wind energy facilities will result in the operation of up to 233 wind turbines and associated access roads, collector lines, and other project facilities in Deuel County. Based on the information gathered by South Deuel Wind, the Project will not have a significant impact on the community or environment when considered with the existing wind projects in proximity to the Project Area. Each project has been or will be sited in accordance with Deuel County and applicable state requirements, which are generally designed to avoid and minimize impacts on the community and the environment. These requirements impose restrictions on each project related to setbacks, noise, and lighting, among others. Likewise, construction of the Deuel Harvest and Tatanka Ridge wind energy facilities has been completed, so construction activities will be limited to those associated only with this Project.

Table 6 identifies both the temporary and long-term ground disturbance impacts expected by Project Facility type. For the purpose of analyzing environmental impacts in this Application, all 73 proposed turbine locations shown in Figure 2 in **Appendix A** are included. Because the Project will construct a maximum of 68 wind turbines, the impact calculations correspondingly overestimate anticipated final Project impacts. Temporary and permanent impacts for upgrades to existing roads will depend on final engineering and the Road Use Agreement currently in negotiation with Deuel County.

Table 6 Summary of Project Ground Disturbance Impacts

Project Facility[a]	Construction Impacts (Temporary)		Operational Impacts (Long-Term)	
	Dimensions	Total Acreage	Dimensions	Total Acreage
Turbines	250-foot radius	329	25-foot radius	3.3
Electrical Collection and SCADA Systems[b]	30 feet wide	320	20 x 15 feet	0.35
Collector Substation	425 x 450 feet	4.4	325 x 400 feet	3
Gen-Tie Line[c]	150 feet wide	66.2	235 square feet	<0.1
O&M Facility	385 x 565 feet	5	280 x 390 feet	2.5
Access Roads[d]	16 to 40 feet wide	106.1	16 feet wide	42.4
MET Towers[e]	150-foot radius	4.9	25 x 20 feet	<0.1
ADLS Towers[f]	150-foot radius	3.2	25 x 35 feet	<0.1
Crane Paths[g]	75 feet wide	199.4	N/A	N/A
General Construction Laydown Yard	900 x 950 feet	20	N/A	N/A
	Total[h]	**1058 acres**	**Total[h]**	**51 acres**

(a) Ground disturbance impact calculations are estimated based on all 73 proposed turbine locations and associated facilities.
(b) Temporary ground disturbance dimensions refer to the width of a single collector circuit. When collector circuits are installed in parallel, temporary ground disturbance impacts will be adjusted to account for each collector circuit being spaced approximately 15 feet apart. Temporary ground disturbance impacts are estimated based on 56.5 miles of underground collector circuits installed using a trenching methodology. Use of directional boring in select locations will reduce temporary ground disturbance impacts. Long-term ground disturbance impacts are estimated based on 50 aboveground junction boxes.
(c) Temporary ground disturbance impacts are estimated based on impact to a 50-foot width for the length of the Gen-Tie Line ROW. An additional 30 acres of temporary ground disturbance impacts associated with transmission structure setting, stringing areas, and vegetation clearing is included outside of the estimated 50-foot temporary ground disturbance impact width. Long-term ground disturbance impacts for the Gen-Tie Line are estimated based on transmission structure types for the Gen-Tie Line route.
(d) Ground disturbance impact calculations are estimated based on the type of Project Facility connected to the access road. Total access road length across the entire Project is estimated to be approximately 21.8 miles. Temporary ground disturbance impacts due to turn radii during component delivery are included.
(e) Ground disturbance impact calculations are estimated based on installation of three MET towers.
(f) Ground disturbance impact calculations are estimated based on installation of two ADLS towers.
(g) Ground disturbance impacts are estimated based on 21.9 miles of crane paths.
(h) Total impacts may be overestimated due to overlap of impact footprints.

7. Effect on Physical Environment (ARSD 20:10:22:14)

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

(1) A written description of the regional land forms surrounding the proposed plant or wind energy site or through which the transmission facility will pass;

(2) A topographic map of the plant, wind energy, or transmission site;

(3) A written summary of the geological features of the plant, wind energy, or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area;

(4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plant, wind energy, or transmission site;

(5) A description of the soil type at the plant, wind energy, or transmission site;

(6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control;

(7) Information on areas of seismic risks, subsidence potential and slope instability for the plant, wind energy, or transmission site; and

(8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a description of plans to offset such constraints.

7.1 Geological Resources

7.1.1 Existing Geological Resources

7.1.1.1 Regional Landforms/Physiography

The topography of the Project Area is generally characterized by a hummocky appearance formed by the advance and melting of glacial ice. Topographic relief within the Project Area is moderate with site elevations ranging from approximately 1,750 to 2,010 feet above mean sea level ("AMSL") gently sloping from west to east. The Project Area is located on the eastern side of the Coteau des Prairies, a broad, flat-iron shaped highland of glacial origin with a gently sloping to undulating surface. The Project Area has a variable drainage pattern heading toward the east.

The Project Area is located within the Coteau des Prairies division of the Central Lowland province of the Interior Plains physiographic region. The Central Lowland province is typically characterized by flat lands and glacial landforms (Fenneman and Johnson, 1946; Flint, 1955).

7.1.1.2 Surficial Geology

In Deuel County, based on a review of boring logs (records of the type of rock found during drilling, sampling, and coring), the unconsolidated sediment that formed the Coteau des Prairies is up to 800 feet thick in the Project Area. The stratigraphy of the unconsolidated sediments consists of interbedded till, outwash, and lake sediment deposits that represent a series of glacial advances and retreats of the Quaternary Period. The uppermost unconsolidated layer underlying most of the Project Area is late Wisconsin age Altamont end stagnation, and ground moraine from the Des Moines Lobe. The late Wisconsin age till is calcareous, silty, sandy to pebbly clay loam and is yellowish-brown when weathered and dark gray when un-weathered. Outwash silts,

sands, and gravels are also present near the surface in the Project Area and are terrace, valley train, and collapsed deposits associated with late Wisconsin age glaciation. Recent alluvium and outwash deposits are associated with drainage features and stream valleys (Beissel and Gilbertson, 1987). Surficial geology in the Project Area is shown in Figures 5 and 6 in **Appendix A**.

The South Dakota Geological Survey ("SDGS") mapped the following surficial geologic units within the Project Area (SDGS, 2004):

- Qal – Alluvium (Quaternary) – Clay, boulder-sized clasts with locally abundant organic material. Thickness is up to 75 feet (23 meters).
- Qlo – Outwash, undifferentiated (Upper Wisconsin) – Heterogeneous sand and gravel with minor clay and silt, of glaciofluvial origin, including outwash plains, kames, kame terraces, and other undifferentiated deposits. Thickness is up to 30 feet (9 meters).
- Qloc – Outwash, collapsed (Upper Wisconsin) – Heterogeneous sand and gravel of glaciofluvial origin. Deposited as outwash sediments that collapsed due to melting of buried ice. Thickness is up to 90 feet (27 meters).
- Qlte – Till, end moraine (Upper Wisconsin) – Compact, silty clay-rich matrix with sand- to boulder-sized clasts of glacial origin. A geomorphic feature characterized by elevated linear ridges with hummocky terrain locally at former ice sheet margins. The composite thickness of all Upper Wisconsin till may be up to 300 feet (91 meters).
- Qltg – Till, ground moraine (Upper Wisconsin) – Compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin. A geomorphic feature characterized by smooth, rolling terrain. The composite thickness of all Upper Wisconsin till may be up to 300 feet (91 meters).
- Qlts – Till, stagnation moraine (Upper Wisconsin) – Compact, silty, clay-rich matrix with sand-to boulder-sized clasts of glacial origin. A geomorphic feature characterized by hummocky terrain with abundant sloughs resulting from stagnation of ice sheets. The composite thickness of all Upper Wisconsin till may be up to 300 feet (91 meters).

7.1.1.3 Bedrock Geology

The majority of the Project Area is underlain by Pierre Shale. This blue-gray to dark gray Upper Cretaceous shale is composed of beds of bentonite, black organic shale, and light brown chalky shale. It contains minor sandstone, conglomerate, and abundant carbonate and ferruginous concretions, with a thickness of up to 1,000 feet. The Niobrara Formation makes up a narrow strip between the Carlile Shale and the Pierre Shale; this Upper Cretaceous formation runs southwest to northeast through the middle of the Project Area and is composed of white to dark gray argillaceous chalk, marl, and shale. It weathers yellow to orange, and contains thin, laterally-continuous bentonite beds, chalky carbonaceous shale, minor amounts of sand, and small concretions, with a thickness of up to 150 feet (Tomhave and Schulz, 2004). The bedrock geology for the Project Area is shown in Figure 7 in **Appendix A**.

7.1.1.4 Mineral Resources/Economic Deposits

Commercial mineral deposits within the Project Area are limited to sand, gravel, and construction aggregate enterprises. Combined information from the South Dakota Department of Environment and Natural Resources ("SDDENR") Minerals and Mining Program and a review

of United States Geological Survey ("USGS") USMIN Mineral Deposit Database/Prospect-and mine-related features on USGS topographic maps indicates that approximately ten sand/gravel pit sites may have been present within the Project Area (SDDENR, 2023a and USGS, 2006a). (*see* Figure 5 in **Appendix A**). Of the ten potential locations shown, none appear active. Historic sand and gravel operations were also conducted within the Project Area based upon a review of the SDDENR Minerals and Mapping Program and "Sand and Gravel Resources in Deuel County, South Dakota" (Schroeder, 1976). These locations have been verified as abandoned or closed by the SDDENR Minerals and Mapping Program and recent aerial imagery. Due to their glacial origin, the clay deposits found within the Project Area contain silt and significant carbonate, which limits its commercial applications (Beissel and Gilbertson, 1987).

A review of the online information from the SDDENR Oil and Gas Initiative Program verifies that the Project Area is not within a known oil or gas field as most of the current and historic oil and gas development occurs in the western half of the state. The nearest identified oil and gas field is the Lantry field, located approximately 250 miles west of the Project Area (SDDENR, 2023b). No other active or historical economic mineral deposits exist within the vicinity of the Project.

7.1.1.5 Seismic Risks

The risk of seismic activity near the Project Area is extremely low to negligible. According to the USGS 2014 Seismic Hazard Map for the United States, a 2% chance exists for an earthquake to occur within the Project Area in the next 50 years (i.e., a recurrence interval of 2,500 years) that would result in a peak ground acceleration ("PGA") of between 2% of gravity (0.02 grams) to 0.04 grams. The USGS also estimates a 10% chance exists for an earthquake to occur within the Project Area in the next 50 years (i.e., a recurrence interval of 475 years) that would result in a PGA of between 0.01 g and 0.02 g (Petersen et al., 2015). For reference, a PGA of 0.1 g is generally considered the minimum threshold for damage to older structures or structures not made to resist earthquakes. According to the short-term induced seismicity models (USGS 2018 1-year model), the chance of potentially minor damage ground shaking in 2018 in the Project Area is less than 1% (USGS, 2018). According to the SDGS, no earthquakes have been recorded in Deuel County or surrounding counties from 1872 to 2013 (SDGS, 2013). A review of the available geologic mapping and information provided by the USGS Earthquake Hazards Program indicates that no identified active or inactive faults occur in the Project Area or vicinity (USGS, 2006b).

7.1.1.6 Subsidence Potential

The potential for subsidence or slope instability within the Project Area is negligible and is not considered to be a risk. The Pierre Shale and Niobrara Formation bedrock are buried by between 200 and 800 feet of glacial till and outwash across the entire Project Area. The bedrock units do not exhibit karst topography or contain layers susceptible to dissolution by water. Historic underground mining operations, which could lead to an increase in subsidence potential, do not exist within the Project Area.

7.1.2 Geological Resources Impacts/Mitigation

The geologic conditions within the Project Area are appropriate for the construction of the Project. Excavation, bearing, and groundwater conditions associated with the underlying

unconsolidated materials, Pierre Shale, and other sedimentary bedrock in the Project Area are anticipated to be conducive to construction and operation of the Project Facilities. Excavation and/or grading will be required to install some Project Facilities. Geotechnical borings will be completed and soil samples will be tested to determine the engineering characteristics of the site subgrade soils and develop Project Facility-specific design and construction parameters. Construction activities are primarily limited to the upper 10 feet of earth; therefore, excavation required for installing turbines, collection circuits, and communication systems are unlikely to encounter or impact the underlying bedrock. As discussed in Section 18, the Project will be decommissioned after the end of the operational life of the Project. After decommissioning is complete, portions of underground Project Facilities will be abandoned in place; however, these remaining facilities will not result in irreversible changes to the underlying geological conditions of the Project Area.

Due to the limited developed or potential economic mineral resources within the Project Area, the construction and operation of the Project poses no impact to economic mineral resources. Therefore, no mitigation is required for impacts to mineral resources. Additionally, geologic hazards, such as seismicity, are expected to be extremely low to negligible in the Project Area. Due to the limited probability of significant seismically induced ground movements, the Project faces minimal risk of earthquake-related impacts. Therefore, no additional mitigation beyond adhering to prevailing industry specifications will be necessary.

7.2 Soil Resources

7.2.1 Existing Soil Resources

7.2.1.1 Soil Types

The soils within the Project Area generally consist of loams, silty clay loams, and clay loams derived mostly from glacial till, outwash, and alluvium. The soils in the Project Area are not highly susceptible to erosion and are conducive to crop production (U.S. Department of Agriculture Natural Resources Conservation Service ("NRCS"), 2022a).

Within the Project Area, approximately 54.9 percent of the soils have the potential to be highly corrosive to buried steel and approximately 29.3 percent of the soils have the potential to be moderately corrosive to buried steel. Less than one percent of the soils have the potential to be highly corrosive to buried concrete and approximately 13 percent of the soils have the potential to be moderately corrosive to buried concrete. The majority (65.3 percent) of soils in the Project Area are well drained and only 10.4 percent have a significant hydric component (30 to 100 percent of the soil is hydric). Approximately 41.3 percent of the soils are considered to have a high potential for frost action (NRCS, 2022a). **Table 7.2.1.1** lists the soil types comprising over one percent of the Project Area and their characteristics. Soil types and distributions within the Project Area are shown in Figure 8 in **Appendix A**.

Table 7.2.1.1 Soil Types Within the Project Area							
Soil Type[a]	**Soil Taxonomy**	**Soil Texture**	**Parent Material**	**Natural Drainage Class**	**Depth to Restrictive Feature (inches)**	**Acres in Project Area[a]**	**Percent of Project Area**
ShB (Singsaas-Waubay silty clay loams, 1 to 6% slopes)	Fine-loamy, mixed, frigid Hapludic Vermiborolls	Silty clay loam	Silty drift over loamy till	Well drained	>79	3,399.1	9.9
Krb (Kranzburg-Brookings silty clay loams, 1 to 6% slopes)	Fine-silty, mixed, superactive, frigid Calcic Hapludolls	Silty clay loam	Loess over fine-loamy till	Well drained	>79	3,113.0	9.1
BkB (Barnes-Svea loams, 1 to 6% slopes)	Fine-loamy, mixed, frigid Udic Haploborolls	Loam	Loamy till	Well drained	>79	2,882.6	8.4
Hm (Hamerly-Badger complex, 0 to 2% slopes)	Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls	Loam	Fine loamy till	Somewhat poorly drained	>79	2,732.2	8.0
VtB (Vienna-Brookings complex, 1 to 6% slopes)	Fine-loamy, mixed, frigid Udic Haploborolls	Silt loam	Loess over fine-loamy till	Well drained	>79	2,327.5	6.8
PwA (Poinsett-Waubay silty clay loams, 0 to 2% slopes)	Fine-silty, mixed, frigid Udic Haploborolls	Silty clay loam	Periglass loess over loamy till	Well drained	>79	2,110.3	6.1
PwB (Poinsett-Waubay silty clay loams, 1 to 6% slopes)	Fine-silty, mixed, frigid Udic Haploborolls	Silty clay loam	Periglass loess over loamy till	Well drained	>79	2,101.1	6.1
BmC (Barnes-Svea-Buse loams, 2 to 9% slopes)	Fine-loamy, mixed, frigid Udic Haploborolls	Loam	Fine loamy till	Well drained	>79	1,327.1	3.9
SbA (Sinai silty clay, 0 to 2% slopes)	Fine, montmorillonitic, frigid Typic Hapluderts	Silty clay	Clayey glaciolacustrine deposits	Well drained	>79	1,203.4	3.5

Table 7.2.1.1 Soil Types Within the Project Area							
Soil Type[a]	**Soil Taxonomy**	**Soil Texture**	**Parent Material**	**Natural Drainage Class**	**Depth to Restrictive Feature (inches)**	**Acres in Project Area[a]**	**Percent of Project Area**
HtA (Hegne-Fulda silty clay loams)	Fine, montmorillonitic, frigid Typic Calciaquerts	Silty clay loam	Clayey glaciolacustrine deposits	Poorly drained	>79	1,148.8	3.3
Lr (Lamoure-Rauville silty clay loams, channeled)	Fine-silty, mixed (calcareous), frigid Cumulic Endoaquolls	Silty clay loam	Silty alluvium	Poorly drained	>79	945.5	2.8
KrA (Kranzburg-Brookings silty clay loams, 0 to 2% slopes)	Fine-silty, mixed, superactive, frigid Calcic Hapludolls	Silty clay loam	Loess over fine-loamy till	Well drained	>79	868.1	2.5
BcB (Barnes-Buse loams, coteau, 2 to 6% slopes)	Fine-loamy, mixed, frigid Udic Haploborolls	Loam	Fine-loamy till	Well drained	>79	845.0	2.5
BxE (Buse-Lamoure, channeled, complex, 0 to 40% slopes)	Fine-loamy, mixed, frigid Typic Calciborolls	Loam	Loamy till	Well drained	>79	653.2	1.9
Z152A (Lamoure silty clay loam, coteau, 0 to 1% slopes, occasionally flooded)	Fine-silty, mixed (calcareous), frigid Cumulic Endoaquolls	Silty clay loam	Silty alluvium	Somewhat poorly drained	>79	631.4	1.8
ShA (Singsaas-Waubay silty clay loams, 0 to 2% slopes)	Fine-loamy, mixed, frigid Hapludic Vermiborolls	Silty clay loam	Silty drift over loamy till	Well drained	>79	613.3	1.8
Mn (McIntosh-Lamoure silty clay loams)	Fine-silty, frigid Aeric Calciaquolls	Silty clay loam	Loess over loamy till	Somewhat poorly drained	>79	497.8	1.4

Table 7.2.1.1 Soil Types Within the Project Area							
Soil Type[a]	**Soil Taxonomy**	**Soil Texture**	**Parent Material**	**Natural Drainage Class**	**Depth to Restrictive Feature (inches)**	**Acres in Project Area[a]**	**Percent of Project Area**
BgD (Barnes-Buse-Svea loams, 2 to 15% slopes)	Fine-loamy, mixed, frigid Udic Haploborolls	Loam	Fine-loamy till	Well drained	>79	468.6	1.4
Z171B (Renshaw-Fordville loams, coteau, 2 to 6% slopes)	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Calcic Hapludolls	Loam	Alluvium over outwash	Somewhat excessively drained	>79	466.1	1.4
Pa (Parnell silty clay loam)	Fine, montmorillonitic, frigid Vertic Argiaquolls	Silty clay loam	Clayey alluvium	Very poorly drained	>79	435.3	1.3
Mk (Mckranz-Badger silty clay loams, 0 to 2% slopes)	Fine-silty, mixed, superactive, frigid Aeric Calciaquolls	Silty clay loam	Loess over fine-loamy till	Somewhat poorly drained	>79	392.9	1.1
Pc (Parnell-Vallers complex)	Fine, montmorillonitic, frigid Vertic Argiaquolls	Silty clay loam	Clayey alluvium	Very poorly drained	>79	386.7	1.1

(a) Soil types comprising more than 1% of the Project Area

7.2.1.2 Drainage Class

The drainage class identifies the natural drainage condition of the soil. It refers to the frequency and duration of wet periods and provides a guide to the limitations and potentials of the soil for field crops, forestry, range, wildlife, and recreational uses. The class roughly indicates the degree, frequency, and duration of wetness, which are factors in rating soils for various uses (NRCS, 2022a). Approximately 63.9 percent of the Project Area is classified as well drained, 12.3 percent somewhat poorly drained, and the remaining 9.9 percent are a combination of somewhat excessively drained, poorly drained, and very poorly drained.

7.2.1.3 Erosion Potential and Slopes

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation USLE and the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter, and on soil structure and saturated hydraulic conductivity ("Ksat"). Factor K values range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The soils in the Project Area have a moderately low to moderate susceptibility to erosion and have K Factors ranging from 0.10 to 0.37, with the majority between 0.17 and 0.28.

A Wind Erodibility Group consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated or disturbed areas. The soils assigned to group 1 are the most susceptible to wind erosion and those assigned to group 8 are the least susceptible. The soils in the Project Area have low to moderate susceptibility to wind erosion and have Wind Erodibility Group designations between 3 and 8, with the majority between 4 and 6. Slopes in the Project Area range from 0 to 40 percent, with most slopes between 1 and 6 percent.

7.2.1.4 Prime Farmland

NRCS farmland classifications include "prime farmland" (land that has the best combination of physical and chemical characteristics for the production of crops), "farmland of Statewide importance" (land other than prime farmland that has a good combination of physical and chemical characteristics for the production of crops), and "not prime farmland" (land that does not meet qualifications for prime farmland), among other classifications. Farmland types within the Project Area are provided in **Table 7.2.1.4**.

Table 7.2.1.4 Summary of Farmland Types Affected by the Project

Farmland Type	Acres in Project Area	Acres of Construction Impacts (Temporary)	Acres of Operational Impacts (Long-Term)
Prime Farmland	21,096	621	40
Farmland of Statewide Importance	1,597	26	1
Not Prime Farmland	5,108	49	3
Prime Farmland if Drained	6,048	140	6
Prime Farmland if Irrigated	491	11	1

7.2.2 Soil Resources Impacts/Mitigation

Construction activities such as clearing, grading, trench excavation and backfilling, as well as the movement of construction equipment within construction workspaces, will 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; however, there will be long-term operational impacts associated with aboveground facilities.

Table 7.2.1.4 identifies the estimated temporary and long-term ground disturbance impacts to farmland types within the Project Area. Land impacted by installation of aboveground Project Facilities will generally be converted to impervious surfaces, thereby altering the soil composition at these locations.

During construction, existing ground cover vegetation will be removed in construction workspaces, which could potentially increase the risk of erosion. Potential impacts to agricultural soils from the Project are discussed in Sections 9.1.2 and 15.2.2. Following completion of construction, all temporary construction workspaces will be cleaned up and restored to pre-construction conditions pursuant to the lease and easement agreements. As discussed in Section 18, the Project will be decommissioned after the end of the operational life of the Project. After decommissioning of the Project is complete, no irreversible changes to soil resources will remain beyond the operating life of the Project.

South Deuel Wind has designed the Project Layout to minimize construction cut and fill requirements, and limit construction in areas with steep slopes, while maintaining optimal turbine locations. Wind turbines are typically located at higher elevations to maximize wind exposure, minimize wind obstructions, and avoid steep slopes for foundation installation. The access road locations generally avoid steep slopes as well. Similar siting efforts apply to the location of the underground collector circuits to avoid crossing steep ravines.

Construction of the Project will require coverage under the SDDENR General Permit for Storm Water Discharges Associated with Construction Activities. To maintain compliance with provisions of this General Permit, South Deuel Wind will prepare a SWPPP to identify potential sources of stormwater pollution from the Project site 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 and will be implemented from the initiation of construction and used through site restoration efforts. During Project operation, stormwater volume, stormwater flow, and erosion and sediment impacts to surface water and groundwater resources are not anticipated to change from pre-construction conditions.

Geotechnical borings will be completed and soil samples will be tested to determine the engineering characteristics of the site subgrade soils and develop Project Facility-specific design and construction parameters. Adjustments to Project Facilities will be made for unsuitable soils as needed.

8. Effect on Hydrology (ARSD 20:10:22:14, 20:10:22:15)

ARSD 20:10:22:15. Hydrology. *The applicant shall provide information concerning the hydrology in the area of the proposed plant, wind energy, or transmission site and the effect of the proposed site on surface and groundwater. The information shall include:*
(1) A map drawn to scale of the plant, wind energy, or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility;
(2) Using plans filed with any local, state, or federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects;
(3) A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission;
(4) If aquifers are to be used as a source of potable water supply or process water, specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of 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

In South Dakota, water-producing bedrock units are deep and therefore expensive to drill and install wells in, may have undesirable water quality, or may not yield an adequate quantity of water where it is needed. The Dakota Formation is the only bedrock unit in the Project Area that contains aquifers. In eastern South Dakota, glacial outwash aquifers provide most of the water supply. Of the 444 public water supply systems east of the Missouri River, 392 (88 percent) use glacial outwash aquifers. The glacial outwash aquifers commonly possess water quality which is better than more deeply buried bedrock-type aquifers, but not always (Iles, 2008).

Three major glacial outwash aquifers are present in Deuel County: Big Sioux, Prairie Coteau, and Altamont (Kume, 1985). The Big Sioux and Prairie Coteau are the two main aquifers crossed by the Project Area (Kume, 1985). Within the Project Area these aquifers range from between 40 to 365 feet below ground surface (Kume, 1985). Water from the Big Sioux Aquifer can be used for domestic, livestock, municipal, and irrigation use; and is widely used for these purposes (Kume, 1985). Water from the Prairie Coteau Aquifer can be used for livestock, and for irrigation, domestic, and municipal uses in certain areas (Kume, 1985).

Within the Project Area, the first occurrence of aquifer materials is mainly sand and gravel greater than 100 feet below ground surface. Shallower occurrences within the Project Area are present along the shores of Fox Lake and Cottonwood Slough, and along the stream beds of

Cobb Creek and its tributaries where aquifers are present in sand and gravel less than or equal to 50 feet below ground surface (Jensen, 2001).

8.1.2 Groundwater Resources Impacts/Mitigation

Construction of the Project is not anticipated to have long-term impacts on groundwater resources. The construction of Project Facilities will likely require dewatering of excavated areas due to shallow groundwater, particularly for turbine foundations or collector circuit trenches. Any dewatering will be temporary and minimized to the extent practicable. Watered groundwater will be properly handled to allow sediments to settle out and be removed before the water is discharged, reducing soil erosion and sedimentation of surface waters. Dewatering will be conducted in accordance with the General Permit for Temporary Discharge Activities and the Temporary Permit to Use Public Waters from the SDDENR. More generally, construction will require coverage under the General Permit Authorizing Stormwater Discharges Associated with Construction Activities (SDR10000). As discussed in Section 7.2.2, South Deuel Wind will prepare a SWPPP to control sources of stormwater pollution during construction and reduce impacts to waterways from runoff. Routine operation and maintenance activities are not expected to affect groundwater resources.

The unlikely accidental release of construction-related chemicals, fuels, or hydraulic fluid into groundwater would have the potential to have an adverse effect on groundwater quality, most notably near shallow water wells. The impacts of spills are mainly linked to fuel storage, equipment refueling, and maintenance activities. Storage of petroleum products in quantities exceeding 100 gallons will be in elevated tanks; such tanks larger than 1,100 gallons will have secondary containment, as necessary.

Water usage at the O&M Facility will be similar to a household volume and any impacts to local groundwater supplies will be negligible.

8.2 Surface Water Resources

8.2.1 Existing Surface Water Resources

8.2.1.1 Hydrology

The USGS, in cooperation with various federal and state agencies, has mapped the hydrologic boundaries of water resources, in order of descending scale, into regions, subregions, basins, sub-basins, watersheds, and sub-watersheds. The Project Area lies within two sub-basins: the Lac qui Parle Sub-basin and the Middle Big Sioux Sub-basin.

Surface drainage in Deuel County is influenced by the Wisconsin glaciation. Stagnation moraine ranges are in local relief from 10 to 90 feet. Drainage is mostly internal, but several meltwater channels transect the area, which contains linear streams that drain west to east off to the Coteau des Prairies.

Stagnation moraine parallels the Bemis and Altamont moraines. All major lake basins and most potholes or sloughs occupy basins formed by melting glacial ice blocks, and all major streams flow in channels that were formed as drainage outlets for glacial meltwater.

Named streams present in the Project Area include Cobb Creek, Hidewood Creek, and North Branch Cobb Creek. The single named lake within the Project Area is Cottonwood Slough.

Most (22,782 acres or 66.4 percent) of the Project Area is within the Lac qui Parle Sub-basin. This sub- basin is characterized by dendritic parallel meltwater channels with a few lakes. Outflow from the Project Area within this basin is Cobb Creek and its unnamed tributaries, which flow northwest to east to Florida Creek. Florida Creek flows north and east approximately 6 miles northeast of the Project Area.

Lake Francis and Lone Tree Lake are the largest waterbodies within the Lac qui Parle Sub-basin. Lake Francis has an outlet on the southeast corner and drains into Monighan Creek. Lone Tree Lake has an outlet on the southeast corner and drains into an unnamed tributary to Lost Creek.

The remaining 11,557 acres (33.6 percent) of the Project Area lie within the Middle Big Sioux Sub-basin. The entire Big Sioux River Watershed drains approximately 8,282 square miles in eastern South Dakota, southwestern Minnesota, and northwestern Iowa. The Big Sioux River and its large associated glacial aquifer provide most of the domestic water supply for towns and rural areas throughout its course, which includes the growing area in and around Sioux Falls.

8.2.1.2 National Park Service Nationwide Rivers Inventory

The National Park Service ("NPS") Nationwide Rivers Inventory ("NRI") is a listing of more than 3,200 free-flowing river segments in the U.S. that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. Under a 1979 Presidential Directive, and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments (NPS, 2023). No NRI-listed rivers occur within the Project Area. The nearest NRI-listed river to the Project Area is the South Fork Yellow Bank River, located approximately 18 miles north of Project Area paralleling the Deuel/Grant County line in Grant County.

8.2.1.3 Impaired Waters

The goal of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (33 U.S.C §1251(a)). Under CWA Section 303(d), states, territories, and authorized tribes, collectively referred to in the Act as "states," are required to develop lists of impaired waters. These are waters for which technology-based regulations and other required controls are not stringent enough to meet the water quality standards set by states. The law requires that states establish priority rankings for waters on the 303(d) lists and develop Total Maximum Daily Loads ("TMDL") for these waters. A TMDL includes a calculation of the maximum amount of a pollutant that can be present in a waterbody and still safely meet water quality standards (EPA, 2023).

One 303(d)-listed waterbody, Hidewood Creek, occurs within the northwestern portion of the Project Area. In 2008, a restoration plan of fecal coliform TMDL was developed by the United States Environmental Protection Agency ("EPA") for this stream. This waterbody is also listed

as impaired for fecal coliform in the 2022 South Dakota Integrated Report for Surface Water Quality Assessment (SDDENR, 2022).

8.2.1.4 Floodplains

Floodplains perform many natural functions such as storing excess water, slowing floodwaters, recharging groundwater, providing habitat, and filtering pollutants. Filling floodplains diminishes these vital functions. The Federal Emergency Management Agency ("FEMA") maintains materials developed to support flood hazard mapping for the National Flood Insurance Program. Flood hazard mapping provides states, local communities, and Tribes with flood risk information and tools that they can use to increase their resilience to flooding and better protect people and property through collaboration with state and local entities.

There are portions of Deuel County that have not been mapped for FEMA floodplains. However, the area surrounding Brandt, South Dakota was mapped for floodplains in 2022, of which a portion crosses into the Project Area. Of the mapped FEMA Flood Zone A, 98 acres are within the Project Area and are shown in Figure 9 of **Appendix A**.

8.2.2 Surface Water Resources Impacts/Mitigation

Surface water pollution in the region primarily stems from suspended sediments, excess nutrients like nitrogen and phosphorus, pesticides, pathogens, and biochemical oxygen demand. The artificial alteration of drainage systems and reduction of wetlands can often be linked to high sediment and nutrient concentrations, intensifying storm and snowmelt runoff events. Overland runoff across erodible soils exacerbates nutrient levels in lakes and streams, often carrying pesticides and excess nutrients into receiving waters. Increased discharges and flood peaks also cause streambank erosion, impact shoreline vegetation, and deposit sediment in downstream receiving waters. Sediment often impairs aquatic habitat, reduces photosynthesis, and diminishes recreational quality, while elevated nutrient levels often foster eutrophication and algal blooms.

Potential impacts to surface waters due to the Project include transport of sediment into waters during construction due to excavation and the exposure of soils. Increase in impervious surfaces from development of the aboveground Project Facilities will constitute approximately 51 acres, representing approximately 0.1% of the Project Area and will be dispersed throughout the Project Area. Because the Gen-Tie Line will span any wetlands or streams, no impacts to surface waters are anticipated from the Gen-Tie Line. However, if there are impacts to wetlands or streams, they will be permitted in compliance with the CWA. Increased sedimentation, reduction of available flood storage, and impacts to drainage patterns due to stormwater runoff from the Project during construction and operation will be minimized by BMP. The use of BMP, further described in Section 9.2.2, will minimize the delivery of sediment due to erosional processes. The Project is not expected to cause significant changes to existing hydrology or stormwater runoff.

8.2.2.1 NRI-Listed Rivers

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

8.2.2.2 Impaired Waters

There is one 303(d)-listed waterbody within the Project Area. The current design avoids this waterbody, therefore the construction and operation of the Project poses no impact to this resource. Therefore, no mitigation is required for impacts to 303(d)-listed water bodies.

8.2.2.3 Water Quality

Excavation and exposure of soils during construction can cause an increase in stormwater runoff and sedimentation in receiving waters during storm events. Coverage under the General Permit for Storm Water Discharges Associated with Construction Activities, administered by the SDDENR, will be required for the Project. As discussed in Section 7.2.2, a SWPPP will be developed and implemented for the Project that identifies potential sources of stormwater pollution from the Project site and specifies the structural and non-structural controls, or BMP, that will used to minimize the negative impacts to receiving waters caused by stormwater discharges associated with the construction activities. The BMPs may include silt fences, straw wattles, erosion control blankets, Project staging, and other methods to control erosion and sedimentation. The erosion and sediment controls that will be implemented during Project construction and operation are expected to avoid negative impacts to water quality.

8.2.2.4 Drainage Patterns

The dispersed nature of the Project Facilities will not provide enough of a concentration of increased impervious surfaces in any specific location to change drainage patterns. With the Project Facilities, where practicable, generally located at higher elevations, impacts to streams and drainageways are not anticipated.

The installation of the electrical collection system may impact drainageways, but these impacts would be temporary in nature, with existing contours and drainage patterns restored after trenching, typically within 24 hours. 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.

8.2.2.5 Increased Runoff

The creation of impervious surfaces reduces the ability of soils to infiltrate precipitation to groundwater, potentially increasing the volume and rates of stormwater runoff. The aboveground Project Facilities will create up to approximately 51 acres of impervious surfaces. Infiltration will be inhibited within the newly created impervious surfaces, and incremental increases in stormwater runoff may be exhibited immediately adjacent to these surfaces. The increase in impervious surfaces represents approximately 0.1% of the Project Area, and the implementation of stormwater BMPs is anticipated to adequately mitigate any increases in runoff resulting from construction. Moreover, the dispersed nature of the Project Facilities will not provide a significant enough concentration of additional impervious surfaces in any specific location to alter drainage patterns. As such, the Project is not anticipated to cause significant changes in runoff patterns or volume.

8.2.2.6 Flood Storage Areas

There are 98 acres of FEMA Flood Zone A within the Project Area. Based on the Project Layout, any potential impacts to floodplains will be temporary in nature, and existing contours and elevations would be restored upon completion of construction.

8.3 Current and Planned Water Uses

8.3.1 Current and Planned Water Use

The Brookings-Deuel Water District ("Water District") supplies rural water to the Project Area and maintains a network of distribution lines within the Project Area. Private wells that supply water for domestic and irrigation purposes are also located throughout the Project Area.

8.3.2 Current or Planned Water Use Impacts/Avoidance

South Deuel Wind analyzed the current planned water uses by communities, agriculture, recreation, fish, and wildlife to determine their potential to be affected by the Project. Surface water appropriation, permanent dewatering, deep well injection, and water storage, reprocessing, or cooling will not be required for construction or operation of the Project. Water use at the O&M Facility will be similar to household volume and is anticipated to be less than five gallons per minute. South Deuel Wind will coordinate with the Water District to locate and map its network of distribution lines within the Project Area and determine if a rural water supply connection is possible for the O&M Facility.

If connection to the rural water supply is not feasible, a water supply well will be required for the O&M Facility. Additionally, if rural water supply is not available, a private wastewater treatment system will be required. If required, this system would be developed to meet the requirements of the SDDENR.[7] Use of water for operations will be negligible and will not create undue burden; therefore, no mitigation is proposed. The Project will not impact municipal or private water uses in the Project Area.

If required, construction dewatering will be conducted in accordance with the General Permit for Temporary Discharge Activities and the Temporary Permit to Use Public Waters from the SDDENR. Residential domestic wells will not be impacted by construction dewatering due to a minimum setback of four times the wind turbine tip height from non-participating residences and 1,500 feet from participating residences. If water supply wells are located near potential construction dewatering locations, provisions would be made to ensure that an adequate supply of water is provided until construction dewatering activities have ceased. These impacts are expected to be minor and temporary. Surface water availability for communities, schools, agriculture, recreation, fish, or wildlife will not be impacted.

The Project will have no impact on surface water availability or use for communities, agriculture, recreation, fish, or wildlife. As discussed in Section 9.2.2, minimal permanent impacts to wetlands and streams are anticipated. Any impact to wetlands and streams will be appropriately permitted in compliance with the CWA. Following construction, temporary impacts to wetlands and streams would be restored to pre-construction conditions.

[7] Per ARSD 20:10:22:15(4).

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

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

9.1 Vegetation

9.1.1 Existing Terrestrial Ecosystem

Terrestrial ecosystems data were collected from literature searches, federal and state agency reports, and natural resource databases. Biologists from Burns & McDonnell Engineering Company, Inc. ("Burns & McDonnell") provided regional and site-specific information for terrestrial resources.

The Project Area is within the Prairie Coteau level IV ecoregion of the level III Northern Glaciated Plains ecoregion, which encompasses the eastern edge of South Dakota (EPA, 2016). The Prairie Coteau ecoregion roughly coincides with the southern limits of continental glaciation, and has a tightly undulating, hummocky landscape with no drainage patterns. As a result, the area is perforated with closely spaced semi-permanent and seasonal wetlands, locally referred to as Prairie Potholes. It has higher precipitation levels than other coteaus, such as the Missouri, which allows widespread burr oak woodlands to grow near wetland margins (Bryce et al., 1996). Historically, this ecoregion supported both tallgrass and shortgrass prairies; however, the native grasslands have been predominantly converted to agriculture croplands (Bryce et al., 1996), with corn (*Zea mays*) and soybeans (*Glycine max*) as the dominant crops (Miller, 1997). Natural vegetation in the region includes big and little bluestem (*Andropogon gerardii* and *Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), Indiangrass (*Sorghastrum nutans*), and blue grama (*Bouteloua gracilis*). Woodlands surround wetlands in the northeast section of this region. The Prairie Coteau contains frigid udic soils composed of glacial till above cretaceous shales. Pasturelands in the region are composed of rolling areas, while flatter areas are utilized for agriculture.

The majority of the Project Area has been converted to agricultural use, with 73 percent of the Project Area being used for cultivated crops. The second dominant land use cover type is herbaceous (16 percent), although no differentiation was made between planted (introduced) and native grasses within the available National Land Cover Database ("NLCD") data (NRCS, 2022b). Wetland areas occur throughout the Project Area, and total approximately five percent of the Project Area (**Appendix F**). NLCD data for the Project Area is shown in Figure 10 in **Appendix A**.

9.1.1.1 Farmland

In Deuel County in 2022 (the latest available year for the USDA Census of Agriculture data), approximately 45 percent of the land in the county was cropland (USDA, 2024). Soybeans were the most commonly cultivated crop, and corn for grain was the second (USDA, 2024). Specific acreages of different crops within the Project Area, which change from year to year, are not available. In Deuel County in 2022, approximately 16 percent of the land in the county was pastureland (USDA, 2024). Farmland types within the Project Area are shown in **Table 7.2.1.4**.

9.1.1.2 Grasslands

In order to identify the location and quality of grassland within the Project Area, a desktop review was conducted by reviewing the grassland layers from South Dakota State University (South Dakota State University, 2016), the NLCD (USDA NRCS, 2022b), National Agriculture Imagery Program ("NAIP") aerial photography (USDA, 2015), USFWS National Wetland Inventory ("NWI") maps (USFWS, 1981), multiple years of Google Earth imagery (Google Earth, 2022), and USFWS conservation, grassland, and wetland easement locations obtained from the USFWS National Realty Tract data (USFWS, 2022b). Broken grasslands are grasslands that have been disturbed in some way, which can include farming, human disturbance, or being a replanted grassland (South Dakota State University, 2016). Unbroken grasslands are those that have little or no historical disturbance and are true grasslands (South Dakota State University, 2016). From this desktop survey, areas that were identified as potentially being unbroken grasslands were assigned an observation point. In total, 244 observation points were marked. Observation points were surveyed in the field by qualified biologists from October 10 to 12, 2022 and July 31 to August 1, 2023 (**Appendix F**) to further classify the grasslands as low-, medium, and high-quality.

Each observation point was classified into probabilities of being an unbroken grassland, with classifications being "low", "medium", or "high". The classification of "low" was assigned where there was a high level of human disturbance and the vegetation was comprised of a limited number of native warm-season grasses. Alternatively, if the dominant grass species seemed to be cool-season sod-forming varieties typically found in pasturelands or invasive species, such as Festuca sp., Typha sp., and Phalaris arundinacea, a "low" classification was also given. Areas characterized by presence of human disturbance and a relatively high abundance of two or more of the following grass species: little bluestem, big bluestem, sideoats grama (*Bouteloua curtipendula*), prairie dropseed (*Sporobolus heterolepis*), and needle grass, but lacking a dominant layer of sod-forming, cool-season grasses, were classified as "medium". Areas without any evidence of human disturbance, where blooming native forbs were observed and were in relatively high abundance alongside the warm-season grass species mentioned earlier, were classified as "high". Areas identified as "low" and "medium" are considered broken grasslands, due to the level of human activity and the lack of native vegetation. Those areas identified as "high" are considered to be unbroken grasslands, due to the dominance of native vegetation and the lack of human disturbance.

Potential unbroken grassland areas are shown in Figure 11 in **Appendix A**. Approximately 5,123 acres were identified within the Project Area for further analysis through field verification. The field verification of potential unbroken grasslands determined that much of the Project Area has previously been highly impacted due to land conversion to row crop agriculture and the

introduction of non-native, cool-season grass species, both of which has led the Project Area to contain a lower amount of potential unbroken grasslands than what was identified during the desktop review. Overall, field verification identified approximately 335 acres of potential unbroken grassland, and 4,788 acres of broken grasslands.

9.1.1.3 Noxious Weeds

Noxious weeds may be regulated by State (SDCL 38-22) and Federal (*e.g.*, 7 C.F.R. Part 360) rules and regulations designed to stop the spread of plants that are detrimental to the environment, crops, livestock, and public health. According to the South Dakota Department of Agriculture ("SDDOA"), six species of noxious weeds occur and are regulated within Deuel County (SDDOA, 2023) (**Table 9.1.1.4**).

Table 9.1.1.4 Noxious Weeds Occurring in Deuel County

Common Name	Scientific Name	Year Designated	Year Expires
Bull thistle	*Cirsium vulgare*	2023	2027
Musk thistle	*Carduus nutans*	2023	2027
Plumeless thistle	*Carduus acanthoides*	2023	2027
Poison hemlock	*Conium maculatum*	2023	2027
Yellow toadflax	*Linaria vulgaris*	2020	2024
Common mullein	*Verbascum thapsus*	2023	2027

9.1.2 Vegetation Impacts/Mitigation

Construction of the Project will result in temporary and permanent impacts to existing vegetation within the Project Area. These impacts will result in a loss of production of crops and pasture grasses. 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 ground disturbance activities in the construction workspaces. Vegetation communities most sensitive to disturbance are native prairies, grasslands with native plant communities, wetlands, and natural woodlands. The Project has been sited to reduce impacts to these sensitive habitats.

Based on scoping conducted for the Project on the USFWS Information for Planning and Conservation ("IPaC") online review tool, no federally listed plant species are present within the Project Area (USFWS, 2023a).

The Project will result in approximately 1,058 acres of temporary ground disturbance impact and approximately 51 acres of long-term ground disturbance impact to vegetation (predominantly cropland and grassland/pasture). Impacts that occur to cultivated lands are not considered ecologically significant, because these lands are frequently disturbed by tilling, planting, and harvesting activities associated with crop production.

Project Facilities have been sited to generally avoid sensitive habitats. Where sensitive habitats cannot be avoided, additional micro-siting efforts have attempted to reduce impacts to these sensitive habitats. Temporary impacts will be minimized through BMP, such as re-vegetation

and erosion control devices. These measures will reduce impacts to vegetative communities adjacent to Project Facilities. Noxious weeds will be controlled using mechanical mowing and selective herbicide applications, as necessary.

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

- Ground disturbance will be limited wherever practicable during construction in potentially unbroken grasslands and limit the areas where construction vehicles drive through the Project Area;
- Exposed subgrade in areas where the native soil has been removed will be regraded to the original ground contour, and the soil will generally be replaced to follow the original soil profiles;
- Disturbed areas will be reseeded with a regionally appropriate seed mixture at an appropriate application rate; and
- Damage to crops that occur on cultivated lands during construction will be compensated for by South Deuel Wind.

To the extent practicable, Project Facilities have been sited to avoid crossing tree rows and woodlots. Some minor clearing of brush may be required. For the Gen-Tie Line, the ROW will be cleared prior to construction, and will be maintained free of woody vegetation that would interfere with safe and reliable operation. Overall, tree-clearing activities and vegetation removal for the Project will be minimized to the extent practicable.

9.2 Wetlands and Waterbodies

9.2.1 Existing Wetlands and Waterbodies

Wetlands are defined in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987), as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The Manual identifies three wetland criteria that must be met for a wetland to be present: dominance of hydrophytic vegetation, hydric soils, and sufficient hydrology. Some wetlands, as well as other waterbodies, are considered waters of the U.S. under Section 404 of the CWA and are, therefore, regulated by the USACE with respect to discharge of fill material into the water features.

The USACE has the authority to regulate the discharge of dredged and fill material into jurisdictional waters of the U.S., including some wetlands. On August 8, 2023, an amendment to the 2023 Waters of the U.S. Rule, conforming to the U.S. Supreme Court decision in *Sackett v. EPA*, was announced by the EPA and USACE. While the amendment was effective immediately upon its publication in the Federal Register, its application is currently limited to the 23 states not involved in litigation against the 2023 Rule; South Dakota, being among the 27 states in litigation, maintains its pre-2015 regulatory regime.

Prior to conducting a field delineation, a desktop review of wetlands and other waters of the U.S. was conducted for the Project. The review was conducted for the location of Project Facilities, including all proposed turbine locations and the Gen-Tie Line route, and buffers around certain

Project Facilities. The buffers on Project Facilities included turbine locations (500-foot radius), the Gen-Tie Line (100-feet on either side of the centerline), access roads (100-feet on either side of the centerline), and collector circuits (50-feet on either side of the centerline). The Project Facilities and associated buffers are collectively referred to as the Survey Corridor, totaling approximately 3,434 acres.

The desktop review of wetlands and other waters of the U.S. included reviewing NWI maps (USFWS, 2022a; **Appendix E**). NWI maps are produced by the USFWS and provide reconnaissance-level information including the location, type, and size of these resources. NWI maps are produced by reviewing high-altitude imagery, and interpretation is variable based on quality of aerial photographs, experience of the interpreter, and whether ground-truthing was conducted. According to the NWI maps, approximately 79 acres out of the approximately 3,434-acre Survey Corridor consisted of freshwater emergent wetlands, freshwater ponds, riverine, lake, or freshwater forested/shrub wetlands (USFWS, 2022a; **Appendix E**). Approximately 2.3% of the Survey Corridor is mapped as potential wetlands or other waters of the U.S.

Field wetland and waterway delineations for the Survey Corridor were completed from October 24 to November 9, 2022. A follow-up wetland delineation to incorporate updates to the Project Layout was conducted from July 10 to August 1, 2023 (**Appendix E**). The field delineation was conducted in accordance with the USACE 1987 Manual (Environmental Laboratory, 1987) and the 2010 Midwest Regional Supplement (USACE, 2010).

A total of 102.1 acres of wetlands and 7,012 linear feet of stream channel were identified within the Survey Corridor. **Table 9.2.1a** summarizes the types and acreages of field delineated wetlands within the Survey Corridor, and **Table 9.2.1b** summarizes the types and lengths of field delineated streams within the Survey Corridor.

Table 9.2.1a Wetland Types Delineated Within the Survey Corridor

Wetland Classification	Area of Wetland Within Survey Corridor (acres)
Palustrine Emergent (PEM)	93.03
Palustrine Scrub-Shrub (PSS)	4.82
Palustrine Forested (PFO)	3.38
Palustrine Unconsolidated Bottom (PUB)	0.84
Total	**102.1**

Source: Wetland Delineation Report (**Appendix E**)

Table 9.2.1b Stream Types Delineated Within the Survey Corridor	
Stream Classification	**Length of Stream Within Survey Corridor (feet)**
Ephemeral	4,632
Intermittent	2,257
Perennial	123
Total	**7,012**

Source: Wetland Delineation Report (**Appendix E**)

9.2.2 Wetland and Waterbody Impacts/Mitigation

Impacts to wetlands, streams, and other water resources could occur by directly filling water resources during construction, or by otherwise negatively altering their quality. South Deuel Wind anticipates that the Project will avoid significant impacts to wetland areas and streams, and any impacts will be permitted in compliance with the CWA. To the extent practicable, Project Facilities have been sited in upland areas, avoiding low-lying wetlands and streams. Wetland areas and streams will generally be avoided when routing access roads and collector circuits. Collector circuits that cross delineated wetlands and streams will be constructed by directionally boring beneath water features to the extent practicable. Temporary impacts associated with crane paths will also be minimized. To further protect wetlands and streams, BMPs for sediment and erosion control will be implemented. To limit the risk of contamination of wetlands and streams due to accidental spilling of fuels or other hazardous substances, construction equipment will be refueled in areas away from wetlands or drainage areas, and a spill kit would be available at the construction site.

9.3 Wildlife

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

South Deuel Wind followed the processes outlined by the WEG, ECPG, and the South Dakota guidelines for developing, constructing, and operating wind energy projects. South Deuel Wind has been, and will continue to be, engaged in ongoing coordination with the USFWS and SDGFP to seek input on wildlife resources potentially occurring within the Project Area, to seek guidance on the appropriate studies, and to inform development of avoidance and minimization

measures for the Project. Summaries of coordination meetings are provided in Section 22.2, and **Appendix D** contains all substantive agency correspondence to date.

9.3.1 Existing Wildlife

Numerous wildlife studies have been completed for the Project between 2016 and 2023, which are described in the sections below. As often occurs during development of a wind energy facility, South Deuel Wind has refined the Project Area since wildlife studies began; therefore, the Project Area used for the studies has evolved to the final Project Area.

The sections below summarize the assessments and surveys conducted at the Project relating to migratory birds, bats, and other special status species. While the Project area boundary has varied through the years, due to the similar land cover and ecological makeup across the region the results of each survey are consistent with what is expected for the 2024 Project Area.[8]

Wildlife species associated with croplands, grasslands, and shrublands are generally common types of species observed and expected to occur within the Project Area. A Site Characterization Study was completed in 2017 and updated in 2023 to summarize biological resources in the Project Area and to identify potential sensitive species or habitats that could be located near the Project. These studies informed multiple site visits and field surveys conducted by Burns & McDonnell (**Appendices G, H, I, J, K,** and **L**) to characterize the Project Area. A list of representative wildlife species that are likely to be found in the Project Area is provided in **Table 9.3.1**. No black-tailed prairie dog *(Cynomys ludovicianus)* colonies were noted in the Project Area during the various field efforts and this species is not currently documented within Deuel County, South Dakota (SDGFP, 2022a).

[8] The historical project area boundaries are shown on Figure 1 of Appendix K Bird and Bat Conservation Strategy.

Table 9.3.1 Representative Common Wildlife Species Potentially Occurring in the Project Area			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Birds		**Mammals**	
American bittern	*Botaurus lentiginosus*	Big brown bat	*Eptesicus fuscus*
American kestrel	*Falco sparverius*	Eastern red bat	*Lasiurus borealis*
American white pelican	*Pelecanus erythrorhynchos*	Hoary bat	*Lasiurus cinereus*
Bald eagle	*Haliaeetus leucocephalus*	Little brown bat	*Myotis lucifugus*
Broad-winged hawk	*Buteo platypterus*	Silver-haired bat	*Lasionycteris noctivagans*
Canada goose	*Branta canadensis*	White-tailed deer	*Odocoileus virginianus*
Double-crested cormorant	*Phalacrocorax auritus*	Coyote	*Canis latrans*
Franklin's gull	*Leucophaeus pipixcan*	Masked shrew	*Sorex cinereus*
Great blue heron	*Ardea herodias*	Eastern cottontail	*Sylvilagus floridanus*
Great egret	*Ardea alba*	White-tailed jackrabbit	*Lepus townsendii*
Mallard	*Anas platyrhynchos*	Thirteen-line ground squirrel	*Spermophilus tridecemlineatus*
Merlin	*Falco columbarius*	Beaver	*Castor canadensis*
Northern harrier	*Circus cyaneus*	**Reptiles and Amphibians**	
Red-tailed hawk	*Buteo jamaicensis*	American toad	*Anaxyrus americanus*
Ring-necked duck	*Aythya collaris*	Canadian toad	*Anaxyrus hemiophrys*
Rough-legged hawk	*Buteo lagopus*	Woodhouse's toad	*Anaxyrus woodhousii*
Snow goose	*Chen caerulescens*	Boreal chorus frog	*Pseudacris maculata*
Swainson's hawk	*Buteo swainsoni*	Northern leopard frog	*Rana pipiens*
Turkey	*Meleagris gallopavo*	Snapping turtle	*Chelydra serpentina*
Turkey vulture	*Cathartes aura*	Painted turtle	*Chrysemys picta*
Western grebe	*Aechmophorus occidentalis*	Prairie skink	*Plestiodon septentrionalis*
White-fronted goose	*Anser albifrons*	Red-bellied snake	*Storeria occipitomaculata*
Wood duck	*Aix sponsa*	Plains garter snake	*Thamnophis radix*
		Common garter snake	*Thamnophis sirtalis*

9.3.1.1 Migratory Birds

Numerous avian species use the Project Area. The Migratory Bird Treaty Act ("MBTA") is the basis for migratory bird conservation and protection in the U.S. The Bald and Golden Eagle Protection Act provides protection for bald and golden eagles (USFWS, 2024).

The Project Area is in the Central Flyway, used by migrating waterfowl, songbirds, shorebirds, and raptors. The Project Area encompasses diverse wetlands, open water, and cultivated croplands that may provide suitable foraging and stopover habitat for migrating avian species. Important Bird Areas ("IBAs"), as defined by the National Audubon Society, are important for the conservation of bird populations at the global, regional, or local levels. This includes sites for breeding, wintering, and/or migrating birds, as well as providing essential habitat for one or more species (National Audubon Society, 2023). The closest registered IBA to the Project Area is the Prairie Coteau Complex IBA. A portion of this IBA complex is located approximately 3.4 miles east of the Project Area, and another portion is approximately 7 miles southeast of the Project Area, both located in Minnesota (National Audubon Society, 2023). The Prairie Coteau Complex IBA consists of six separate areas containing a variety of private lands, The Nature Conservancy lands, and State of Minnesota WMAs and WPAs (National Audubon Society, 2023). This IBA contains numerous wetlands that contain native tallgrass prairies, including sedge wetlands, which attract a diverse variety of prairie, grassland, and marsh birds.

The USFWS lists 34 species as Birds of Conservation Concern within the Prairie Potholes Bird Conservation Region 11, in which the Project is located (USFWS, 2021). These avian species are protected under the MBTA and are species that may become listed as federally threatened or endangered without conservation measures being enacted (USFWS, 2021a). Of these 34 species, 24 could potentially use or occur in appropriate habitats (e.g., wetlands, grasslands, forested areas) within the Project Area during migration, nesting, or wintering (Jennings et al., 2005). The combination of wetlands and grasslands in the Project Area may attract nesting, foraging, and roosting birds, and grain fields may provide additional feeding opportunities.

Avian Surveys
The following studies were conducted to identify the avian species composition and temporal and spatial activity within and surrounding the Project Area.

Breeding Bird Survey
The breeding bird survey was conducted to evaluate abundance and species composition of bird species that may use the grassland habitat within the 2016 Project area, which includes the current Project Area (WEST, 2016a).

The breeding bird survey was conducted from June 15 to June 30, 2016, and included 11,400 meter transects within the 2016 Project area (Western EcoSystems Technology, Inc. ["WEST"], 2016). The surveyor documented species, number of individuals, approximate distance away, flight height, flight direction, activity, and the detection type. While the survey was not solely conducted on the Project Area, the survey encompassed this area. Therefore, the results describe the bird species within and surrounding the Project Area.

Results
A total of 412 individual bird observations in 244 separate groups, belonging to 30 avian species were recorded within 100 meters of the observer (WEST, 2016). There were no threatened, endangered, or candidate species observed during the survey. One SDGFP Species of Greatest Conservation Need ("SGCN") species, the American pelican (Pelecanus erythrorhynchos), was identified during the survey. Three USFWS birds of conservation concern were observed: dickcissel (*Spiza americana*), grasshopper sparrow (*Ammodramus savannarum*), and upland sandpiper (*Bartramia longicauda*) were observed.

Avian Use Surveys
The large bird use survey was conducted to assess species composition, identify the temporal and spatial use of large birds within the Project Area; document any threatened, endangered, and other species of concern; and to document eagle observations within the Project Area as defined at the time of survey.

The first-year large bird use survey was conducted from April 4, 2016 to March 23, 2017, on the 2016 Project area, with 35 survey points (WEST, 2017), the second-year was from May 2017 to April 2018, on the 2017 Project area, with 33 to 40 survey points, and the third-year was from June 2021 to July 2022, on the Project Area, with 31 survey points (**Appendix G**). Each plot had an 800-meter radius and was surveyed for an hour once a month for the year. The surveyor documented species, number of individuals, approximate distance away, flight direction, and activity occurring within the vicinity of the plots. The number of survey points varied for the three surveys due to modifications to the Project area over time.

Results
The first-year survey recorded 15,163 large bird observations of 41 species. Waterfowl made up 88.8% of the large birds recorded during the survey year, with most of them being species of goose. There were 200 observations identified as raptors with 10 species documented. There were 11 bald eagle observations, one golden eagle observation, and most of the rest were identified as red-tailed hawk or northern harrier (*Circus hudsonius*). Overall observations and eagle observations were most common in the winter months. No federally threatened or endangered species were observed during the first-year surveys. The American white pelican (*Pelecanus erythrorhynchos)*, which is listed as one of South Dakota's Species of Greatest Conservation Need, had 13 observations during the survey. A total of 11 bald eagles and one golden eagle were observed during the large bird use surveys in the first year (WEST, 2017).

The second-year survey recorded 2,076 large bird observations of 24 species. Waterfowl made up 82.2% of the large birds recorded during the survey year, with most of them being species of goose. There were 195 observations identified as raptors with 29 observations identified as eagles, 26 bald eagles, and three golden eagles, and most of the rest were identified as red-tailed hawk (96 observations). Overall observations and eagle observations were most common in spring months. No federally threatened or endangered species were observed during the second-year surveys. The American white pelican had 45 observations during the second-year survey. A total of 26 bald eagles and three golden eagles were observed during the large bird use surveys in the second year.

The third-year survey recorded 1,259 large bird observations of 26 species. Waterfowl made up 51.7% of the large birds recorded during the survey year, most of them being species of goose. 170 observations were identified as raptors with 35 observations identified as eagles, 35 bald eagles and 0 golden eagles, and most of the rest identified as red-tailed hawks (58 observations). Overall observations and eagle observations were most common in fall months. No federally threatened or endangered species were observed during the third-year surveys. The American white pelican had 60 observations during the third-year survey. A total of 35 bald eagles and 0 golden eagles were observed during the large bird use surveys in the third year (**Appendix G**).

9.3.1.2 Raptors

Raptor Species with Potential to Occur in the Project Area

Based on raptor distribution maps, one vulture species, eight owl species and 16 diurnal raptor species could occur in or near the Project Area during the summer, winter, or migration (**Table 9.3.1.2**). Migration covers both the spring and fall seasons and is representative of the timeframe as opposed to the activity. Of these 25 species, 15 have the potential to breed in the Project Area. This is based on potentially suitable nesting habitat and the individual breeding ranges of the species (SDGFP, 2022b; NatureServe, 2022).

Table 9.3.1.2 Raptor Species Potentially Occurring in the Project Area					
Common Name	**Scientific Name**	**Year-round**	**Summer**	**Winter**	**Migration**
Diurnal Raptors					
American kestrel	*Falco sparverius*		X		X
Bald eagle	*Haliaeetus leucocephalus*	X			
Broad-winged hawk	*Buteo platypterus*		X		X
Cooper's hawk	*Accipiter cooperii*	X			
Golden eagle	*Aquila chrysaetos*			X	X
Gyrfalcon	*Falco rusticolus*				X
Ferruginous hawk	*Buteo regalis*				X
Merlin	*Falco columbarius*				X
Northern goshawk	*Accipiter gentilis*				X
Northern harrier	*Circus cyaneus*	X			
Osprey	*Pandion haliaetus*				X
Peregrine falcon	*Falco peregrinus*				X
Red-tailed hawk	*Buteo jamaicensis*	X			
Rough-legged hawk	*Buteo lagopus*			X	X
Sharp-shinned hawk	*Accipiter striatus*			X	X
Swainson's hawk	*Buteo swainsoni*		X		X
Owls					
Barn owl	*Tyto alba*		X		X
Burrowing owl	*Athene cunicularia*		X		
Eastern screech owl	*Megascops asio*	X			
Great horned owl	*Bubo virginianus*	X			
Long-eared owl	*Asio otus*	X			
Northern saw-whet owl	*Aegolius acadicus*	X			
Short-eared owl	*Asio flammeus*	X			
Snowy owl	*Bubo scandiacus*			X	X
Vultures					
Turkey vulture	*Cathartes aura*		X		X

Source: South Dakota Birds, 2022; SDGFP, 2022b; NatureServe, 2022

The Breeding Bird Survey and Large Bird Use Surveys in 2016, 2017, 2018, 2021 and 2022 identified the red-tailed hawk, northern harrier, American white pelican, golden eagle, and bald eagle, among other species within the Project Area.

Potential for Raptor Migration
Several factors influence the migratory pathways of raptors, the most significant of which is geography. Two geographical features often used by raptors during migration are ridgelines and the shorelines of large bodies of water (Liguori, 2005). Updrafts formed as the wind hits the ridges, and thermals created over land and not water, make for energy-efficient travel over long distances (Liguori, 2005). For this reason, raptors sometimes follow corridors or pathways, such as along prominent ridges with defined edges, during migration.

During migration, raptors could rest and forage in the Project Area. Field edges, roads, railroads, buildings, open fields, wetlands, and riparian areas within the Project Area provide potential foraging habitat for raptors where prey species may be concentrated. No unique land features, habitat types, or seasonal differences are known to occur in the Project Area relative to the overall landscape of the region that could concentrate prey and potential use by raptors.

The Project is located on flat to gently rolling land, lacking the defined topographical ridges or other features typically used by migrating raptors. There is a high potential for raptors to use open fields, wetland areas, Fox Lake, Cottonwood Slough, and riparian corridors along the streams and unnamed drainages in the Project Area.

Potential Raptor Nesting Habitat
The current land usages and field studies have shown that small scattered woodlots, wooded farmsteads, shelter belts, and wooded draws and hillsides could provide raptor nesting habitat for species such as the red-tailed hawk and Swainson's hawk (**Appendices G** and **H**). Breeding ground-nesting raptors could nest in small woodlots, shelterbelts, and isolated trees. Ground-nesting species, such as the burrowing owl, short-eared owl, and northern harrier, may nest in the grasslands or wet meadows present in the Project Area. Nesting within developed or agricultural areas could occur in manmade structures, such as abandoned buildings, power poles, ornamental trees, and other infrastructure.

Raptor and Eagle Nest Surveys
Raptor nest surveys were conducted to identify the location and occupancy status of potential raptor nests within and surrounding the Project Area.

The first year of raptor nest survey was conducted via a Robinson R44 helicopter from March 28 to April 1, 2016, using the 2016 Project area, plus a 2-mile buffer for all stick nests and 10-mile buffer for eagle nests. The survey was conducted in accordance with ECPG guidelines before leaf-out, which would severely impair visibility of stick nests, and to coincide when bald eagles are most likely incubating eggs or tending to their young. The survey consisted of transects at approximately 1-mile (1.6 kilometers ["km"]) intervals. When suitable habitat for raptors was identified, the helicopter would approach and begin to circle slowly as to thoroughly assess the entirety of the wooded area to identify any stick nests. If a stick nest was identified, the pilot would approach slowly and position such the nest could be easily observed and photographed.

The second-year raptor nest survey was conducted via vehicle on public roads from May 27 to 30, 2017, using the 2017 Project area. The survey focused on field review of the nest locations

identified in raptor nest surveys within the 2017 Project area from March 28 to April 1, 2016, to the extent practicable, and incidental observation of any new nests for the 2017 breeding season.

The third-year raptor nest survey was conducted via a Robinson R44 helicopter from March 28 to April 2, 2019, using the 2019 Project area, plus a 2-mile buffer for all stick nests and 10-mile buffer for eagle nests. The aerial surveys were conducted in the same manner as the first-year raptor nest survey.

The fourth-year raptor nest surveys were conducted via both a Robinson R44 helicopter on March 24, 2022, and April 26, 2022, and ground surveys on April 20 – 21, June 22, and August 11, 2022, using the 2022 Project area and an additional 2-mile buffer for all stick nests. The aerial surveys were conducted in the same manner as the first-year raptor nest survey. The ground-based surveys consisted of driving public roads within the Project Area and the additional 2-mile buffer to identify new stick nests and document the status of previously found stick nests. When stick nests were found, binoculars were used to determine occupancy and species type.

The fifth-year raptor nest surveys were conducted via a Robinson R44 helicopter on March 29, 2023, using the Project Area and a 2-mile buffer for all stick nests. The aerial survey was conducted in the same manner as the first-year aerial raptor nest survey (**Appendix H**).

Results

In the first-year survey, a total of 83 stick nests were documented in the 2016 Project area and 2-mile buffer. The identified nests included 13 red-tailed hawk (*Buteo jamaicensis*) nests, 17 great horned owl (*Bubo virginianus*) nests, 52 unidentified raptor nests, and one great blue heron (*Ardea herodias*) rookery. A total of four occupied bald eagle nests and three unoccupied, inactive potential eagle nests were observed within the 10-mile buffer around the 2016 Project area; none were within the Project area. No federal- or state-threatened or endangered species were documented during the first-year survey effort.

In the second-year survey, a total of 29 stick nests were documented in the 2017 Project area. The identified nests included eight red-tailed hawk (*Buteo jamaicensis*) nests, three great horned owl (*Bubo virginianus*) nests, 17 unidentified raptor nests (three active, 13 inactive), and one great blue heron (*Ardea herodias*) rookery. No bald eagle nests were observed within the 2017 Project area. No federal- or state-threatened or endangered species were documented during the second-year survey effort.

In the third-year survey, seven eagle nests were identified. Five of the eagle nests were actively occupied by bald eagles. One eagle nest was unoccupied/inactive and met the requirements for an eagle nest, but the species that occupied it was unknown. One eagle nest was actively occupied by a great horned owl. All seven eagle nests were identified within 10 miles of the 2019 Project area, but not within the 2019 Project area. No federal- or state-threatened or endangered species were documented during the third-year survey effort.

In the fourth-year survey, two bald eagle nests and one potential bald eagle nest were identified within the 2-mile buffer of the 2022 Project area. One bald eagle nest and one potential bald

eagle nest were identified within the 2022 Project area. The second bald eagle nest was not located in the 2022 Project area. The potential bald eagle nest within the 2022 Project area met the requirements for an eagle nest but was occupied by a red-tailed hawk. A total of 33 non-eagle stick nests were identified within the 2-mile buffer and 2022 Project area. The species identified included three raptor species (red-tailed hawk, unidentified raptor, and great horned owl) and one waterbird species (great blue heron). No federal- or state-threatened or endangered species were documented during the fourth-year survey effort.

Two of the nests observed in the fourth-year raptor nest surveys were then monitored seven times over five months from March through July 2023. Nest A was a bald eagle nest; during the first monitoring period, two bald eagles were observed brooding on the nest. Two eagles were seen flying over the nest on the next monitoring period, however, the nest had been taken over by a great-horned owl. Bald eagles were not observed nesting in Nest A throughout the rest of the study period. Nest B was a potential bald eagle nest, however, it was not observed to be active throughout the monitoring period.

In the fifth-year survey, three bald eagle nests, and one potential bald eagle nest, were identified. Two of the bald eagle nests were in the 2-mile buffer around the Project Area, and one of the bald eagle nests and the potential bald eagle nest were in the Project Area. A total of 48 non-eagle stick nests were identified within the 2-mile buffer and the Project Area. The species identified include three raptor species (red-tailed hawk, unidentified raptor, and great horned owl) (**Appendix H**). No federal- or state-threatened or endangered species were documented during the fifth-year survey effort.

9.3.1.3 Bats

Bat Species with Potential to Occur in the Project Area

Seven bat species have ranges overlapping the Project Area. The federally endangered and state-threatened northern long-eared bat (*Myotis septentrionalis*) ("NLEB") range overlaps a small portion of the Project Area. The other six bat species with ranges overlapping the Project Area include the eastern red bat (*Lasiurus borealis*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), tricolored bat (*Perimyotis subflavus*), and silver-haired bat (*Lasionycteris noctivagans*) (**Appendix I**). The little brown bat is under review for federal listing and the tricolored bat is proposed for listing as federally endangered. The silver-haired bat is considered a SGCN. Species occurring in South Dakota and potentially occurring in the Project Area are listed in **Table 9.3.1.3**.

Table 9.3.1.3 Bat Species with Known or Potential Occurrence in the Project Area			
Common Name	**Scientific Name**	**Habitat**	**Presence in Project Area**
Big brown bat	*Eptesicus fuscus*	Common in most habitats, abundant in deciduous forests and suburban areas with agriculture; maternity colonies beneath bark, tree cavities, buildings, barns, and bridges.	Likely
Eastern red bat	*Lasiurus borealis*	Abundant tree bat; roosts in trees; solitary.	Likely
Hoary bat	*Lasiurus cinereus*	Usually not found in man-made structures; roosts in trees; very wide-spread.	Likely
Silver-haired bat	*Lasionycteris noctivagans*	Common bat in forested areas, particularly old growth; maternity colonies in tree cavities or hollows; hibernates in forests or cliff faces.	Likely
Northern long-eared bat	*Myotis septentrionalis*	Associated with forests; chooses maternity roosts in buildings, under loose bark, and in the cavities of trees; caves and underground mines are their choice sites for hibernating; on western edge of range.	Unlikely
Little brown bat	*Myotis lucifugus*	Commonly forages over water; roosts in attics, barns, bridges, snags, and loose bark; hibernacula in caves and mines.	Likely
Tricolored bat	*Perimyotis subflavus*	Tree-roosting bat that prefers leaf clusters, moss, or lichen depending on location; hibernates in caves, culverts, bridges, or abandoned mines; forages in forested areas	Unlikely

Source: 2022 Bat Acoustic Study (**Appendix I)**

The Project Area contains approximately 262 acres of deciduous forest (USGS, 2019) suitable for summer tree-roosting bats, primarily located along the forested patches of Cobb Creek, North Branch of Cobb Creek, and Hidewood Creek, and scattered wooded patches throughout the Project Area. No known caves were documented in a literature search for Deuel County; however, a USGS map of potential karst formations showed a narrow band of carbonite rocks extending through eastern South Dakota and Deuel County. It is not anticipated that bats utilize the Project Area during winter due to the lack of known hibernacula or cave habitats.

To characterize use of the Project Area by bats, several types of studies were completed, including bat mist netting surveys, acoustic bat surveys, and a NLEB habitat assessment.

Bat Mist Netting Surveys
Bat mist netting surveys were conducted to identify the bat species within the 2016 Project area, which includes the current Project Area. The bat mist netting surveys were conducted from July 22 to August 15, 2016 in accordance with the study plan that was approved by the USFWS on July 18, 2016. Ten net sites were surveyed, and recorded data included species, age, sex, weight, and reproductive condition for all bats identified. If northern long-eared bats were caught, they were to be banded and tracked using radio telemetry. No other species were to be banded or tracked.

Results
Bats were caught at eight of the 10 sites throughout the survey. Seventeen bats of three species were caught: seven big brown bats (*Epstesicus fuscus*), six eastern red bats (*Lasiurus borealis*), and four hoary bats (*Lasiurus cinereus*). None of these species are on the USFWS or SDGFP lists, and no federal- or state-listed bats were observed throughout the survey.

Acoustic Bat Surveys
Acoustic bat surveys were conducted to identify the level and seasonality of bat activity and the genus of bats within the Project Area as defined at the time of survey.

The first-year acoustic bat survey for the Project was conducted at one monitoring location within the 2016 Project area from April 13 through November 3, 2016. Detectors were deployed on a MET tower in an open crop field with a microphone at a height of approximately 3 meters and a microphone at a height of approximately 45 meters. Detectors were programmed to begin recording 30 minutes before sunset and continued recording until 30 minutes after sunrise. Bat passes were viewed in Analook and CFCread to note potential *Myotis* calls, remove additional noise files from analysis, and to sort bat call files into high-frequency (minimum frequency > 30 kiloHertz [“kHz”]) and low-frequency (minimum frequency < 30 kHz) species groups.

The second-year acoustic bat survey for the Project was conducted at one monitoring location within the 2017 Project area from July 20 through October 17, 2017. The detectors were at the same heights as the first-year acoustic bat survey. Bat passes were viewed in Kaleidoscope to note potential *Myotis* calls, remove additional noise files from analysis, and to sort bat call files into high-frequency (minimum frequency > 30 kHz) and low-frequency (minimum frequency < 30 kHz) species groups. Potential *Myotis* calls were viewed in full spectrum to determine potential occurrence of NLEB (*Myotis septentrionalis*) and little brown bat (*Myotis lucifugus*).

The third-year acoustic bat surveys for the Project were conducted at two monitoring locations within the Project Area from March 31 through November 2, 2022. Detector M-1 was deployed on a MET tower in an open crop field (same location as the previous studies) with a microphone at a height of approximately 3 meters (M-1L) and a microphone at a height of approximately 45 meters (M-1H). Detector G-1 was deployed with a temporary mast at a height of 3 meters in a hay field along a windbreak of eastern redcedar, which is a potentially suitable habitat for some bat species. Detectors were programmed to begin recording 30 minutes before sunset and continued recording until 30 minutes after sunrise. Bat passes were viewed in Kaleidoscope to note potential *Myotis* calls, remove additional noise files from analysis, and to sort bat call files

into high-frequency (minimum frequency > 30 kHz) and low-frequency (minimum frequency < 30 kHz) species groups. Potential *Myotis* or *Perimyotis* calls were viewed in full spectrum to determine potential occurrence of NLEB (*Myotis septentrionalis*), little brown bat (*Myotis lucifugus*), and tricolored bat (*Perimyotis subflavus*) (**Appendix I**).

Results

For the first year, the two microphones were operating for 205 calendar nights. Across both microphones, a total of 410 detector-nights were completed. A total of 690 bat passes were recorded, resulting in an average of 1.7 bat passes per detector night. Relative bat activity was observed to be highest in the summer.

For the second year, the two microphones were operating for 89 calendar nights. Across both microphones, a total of 178 detector-nights were completed. A total of 950 bat passes were recorded, resulting in an average of 5.3 bat passes per detector night. Relative bat activity was observed to be highest in the summer.

For the third year, the three microphones were operating for 216 calendar nights. Across the three microphones, a total of 648 detector-nights were completed. A total of 6,536 bat passes were recorded, resulting in an average of 10.1 bat passes per detector night. Relative bat activity was observed to be highest in the summer. The increase of bat passes during the third-year survey is likely due to the added location of a ground detector placed near potentially suitable habitat whereas in the first and second years, detectors were located on a MET tower in a crop field.

No potential *Myotis* or *Perimyotis* calls were identified in any year of survey (**Appendix I**), indicating the absence of all federally endangered, state-threatened, or proposed federally listed bat species with potential to occur in the Project Area.

Northern Long-Eared Bat Habitat Assessment

A NLEB habitat assessment was conducted to identify areas of potential summer roosting and foraging habitat for the NLEB within the Project Area and a one-mile buffer (**Appendix J**).

Methods

Potentially suitable summer roosting habitat was evaluated using desktop and field methods. The desktop methodology included a review of 2022 NAIP aerial imagery to hand-digitize areas of forest (USDA, 2020). Areas of at least 10 acres of contiguous forest were selected as the core areas of potential NLEB roosting habitat. Forest areas of any size that were within 1000 feet of the core areas were also included as potential habitat. Anthropogenic structures were not included in this assessment, although some suitable structures may occur within 1000 feet of suitable forest habitat. Isolated anthropogenic structures, isolated trees, and isolated small forest stands (less than 10 acres in size) located more than 1,000 feet away from suitable forested habitat were considered unsuitable habitat for NLEB (Henderson and Broders, 2008; USFWS, 2023c). A total of 14 areas met the desktop criteria for potentially suitable summer roosting habitat, six of which are within the Project Area.

The field assessment was conducted between October 10 and October 12, 2022. During the field habitat assessment, the areas identified through the desktop assessment were viewed and photographed from public roads. Dominant tree species, tree sizes, and occurrence of potential roost trees were noted for each area. Areas with mid- to late-successional forest were determined to be suitable for the NLEB, whereas areas that had been cleared or were dominated by early successional forest, such as windbreaks consisting of eastern red cedar (*Juniperus virginiana*), were be determined to be unsuitable.

Results
All 14 areas meeting the desktop criteria for potentially suitable summer roosting habitat were assessed in the field and were determined to be suitable for NLEB. Dominant tree species included eastern cottonwood (*Populus deltoides*), black willow (*Salix nigra*), ash (*Fraxinus* sp.), and maple (*Acer* sp.). One additional area of approximately 22.3 acres was added based on an expansion of the Project Area in 2023. This area has not been evaluated in the field but is assumed to be suitable for the NLEB. Six of the 15 areas, totaling approximately 90 acres, identified as potentially suitable habitat are within the Project Area.

A small portion of forest areas outside the Project Area totaling approximately 19 acres intersect the current range of the NLEB. All the other potentially suitable summer roosting habitat areas are located outside the current range of the species (**Appendix J**).

9.3.2 Sensitive Wildlife Species

9.3.2.1 Federally Listed Species

Federally listed threatened or endangered species could potentially occur within the Project Area. Based on information provided from the IPaC system (USFWS, 2023), five federally listed or candidate terrestrial wildlife species may occur in Deuel County and may occupy habitats present within the Project Area at certain times of the year. These species are the NLEB, tricolored bat, rufa red knot, monarch butterfly, and Dakota skipper. The federally endangered whooping crane is unlikely to occur in Deuel County based on distribution ranges and regional sightings (eBird, 2023; NatureServe, 2023). Federally listed threatened and endangered species are discussed in further detail below.

Northern Long-Eared Bat
The NLEB is protected under the Endangered Species Act ("ESA") and is listed as federally endangered. The NLEB hibernates in caves or abandoned mines during the winter. During the summer, the NLEB may roost beneath loose bark of live, dead, or dying trees. Additionally, the NLEB may roost in barns, in sheds, under bridges, or in other buildings that have little human disturbance. Female NLEBs typically roost as a maternity colony, while male NLEBs tend to roost singly or in small groups. Roosting and foraging habitat include forests, wooded fence rows, and riparian areas. The primary causes of decline in NLEB populations are the rapid spread of white-nose syndrome ("WNS"), caused by the fungus *Pseudogymnoascus destructans,* across the eastern U.S. and the Midwest, habitat degradation, and human disturbance of hibernacula (caves or abandoned mines) during hibernation (USFWS, 2022c).

Although a small portion of the 1-mile buffer around the Project Area intersects with the current NLEB range (264 acres), the closest documented location of an NLEB is approximately 124 miles south of the Project Area, and the closest documented NLEB maternity colony is approximately 130 miles east. The NLEB range in South Dakota tends to follow larger streams and rivers, which could provide habitat for NLEBs, but does not encompass large swaths of land in eastern South Dakota (**Appendix K**). As outlined above, the NLEB habitat assessment conducted in 2022 (**Appendix J**) found that there was suitable summer roosting habitat for NLEBs within the Project Area. Fifteen potentially suitable summer roosting habitat areas were reviewed, six were in the Project Area and nine were in the 1-mile buffer around the Project Area. All 15 areas were deemed to be suitable summer roosting habitat for NLEBs, although only two of these were within the current NLEB range. The six suitable habitat areas within the Project Area totaled 90.3 acres, roughly 0.019% of the Project Area.

In addition to the NLEB habitat assessment, acoustic studies were conducted in the Project Area in 2016, 2017, and 2022. Calls were analyzed by a bat biologist and no calls were identified to come from any *Myotis* species. A mist-netting study was conducted in 2016 and no NLEBs were caught. Due to the lack of documented NLEBs in the area and the relatively small amount of suitable habitat in the area, it is unlikely that NLEBs are using the Project Area.

Tricolored Bat

The tricolored bat is proposed as federally endangered. This species hibernates in caves or abandoned mines during the winter. During the summer, the tricolored bat may roost within leaf clusters of live, dead, or dying trees. Additionally, the tricolored bat may roost in barns, under bridges, culverts, buildings with little human disturbance, or in Spanish moss or lichen at the southern and northern parts of their range, respectively. Female tricolored bats typically roost as a maternity colony, while male tricolored bats tend to roost singly or in small groups. Roosting and foraging habitat include forests, wooded fence rows, and riparian areas. Tricolored bats primarily occupy forest interiors. They do occur in highly fragmented agriculturally dominated landscapes, but generally forage over waterways and forest edges. The tricolored bat occurs in South Dakota but is considered rare with the records all being in the western portion of the state.

Tricolored bat habitat includes forested areas where they roost, forage, or travel. According to 2019 NLCD data, there are approximately 262 acres of deciduous forest within the Project Area. Most of the forested areas are small and highly fragmented and would have limited suitability as tricolored bat habitat. Suitable habitat is likely present along the limited riparian areas within the Project Area. The tricolored bat was determined to be unlikely in the Project Area.

Acoustic studies were conducted in the Project Area in 2016, 2017, and 2022. Calls were analyzed by a bat biologist and no calls were identified to come from any *Perimyotis* species. A mist-netting study was conducted in 2016 and no tricolored bats were caught. Due to the lack of documented tricolored bats in the area and the relatively small amount of suitable habitat in the area, it is unlikely that tricolored bats are using the Project Area.

Rufa Red Knot

The rufa red knot is a medium-sized, stocky, short-necked sandpiper with a rather short, straight bill. The rufa subspecies, one of three subspecies occurring in North America, 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 (USFWS, 2011a). During the breeding season, red knots are typically found in sparsely vegetated, dry tundra areas (Harrington, 2001; All About Birds, 2023).

Outside of the breeding season, red knots are usually found along intertidal, marine beaches (Harrington, 2001). During migration, some red knots can be found flying over inland areas, but these cases are rare (Sibley, 2003). The red knot population is threatened by habitat loss in migration and wintering areas, reduction of quality and quantity of food resources, asynchronies in timing throughout its breeding and migration range, and high predation on the breeding grounds every 3 to 4 years (USFWS, 2014a).

The rufa red knot has documented observations in South Dakota, but they have all been outside the Project Area (All About Birds, 2023). No rufa red knots were observed throughout any of the site visits or the multiple years of avian surveys and therefore is unlikely to be within the Project Area.

Dakota Skipper and Poweshiek Skipperling

The federally threatened Dakota skipper is a species of butterfly that requires upland prairie that is relatively dry and often found on hillsides and ridges for all portions of its life cycle (i.e., it is not a migratory species). Needle grasses (*Stipa* spp.), little bluestem, and other similar clump-forming native warm season grasses, as well as purple coneflower (*Echinacea angustifolia*), are typical of high-quality sites for the Dakota skipper. The Dakota skipper also uses other flowers for nectar, such as fleabanes (*Erigeron* spp.) and black-eye susans (*Rudbeckia* spp.), among others (USFWS, 2018a).

The federally endangered Poweshiek skipperling is a species of butterfly included on the IPaC when the Project began pre-construction studies, and thus was assessed throughout the last several years. However, the Poweshiek skipperling is no longer considered to be within South Dakota due to lack of sightings (USFWS, 2021b), and no longer appears on the IPaC. The Poweshiek skipperling is discussed below due to its historical range being within the Project Area and its continued status as federally endangered. Habitat capable of supporting the federally endangered Poweshiek skipperlings are generally considered to be similar to habitat that can support Dakota skippers. However, the Poweshiek skipperling lives in high quality tallgrass prairie in both low, moist areas and dry, upland areas (USFWS, 2023). This habitat is required for all portions of its life cycle (i.e., it is not a migratory species). The adult Poweshiek skipperlings feed on nectar from prairie flowers such as black-eyed susan, palespike lobelia (*Lobelia spicata*), and purple coneflower (Selby, 2005; USFWS, 2018b).

Sharp population declines for both the Dakota skipper and Poweshiek skipperling have been observed in the last 20 years; however, reasons for this decline are still poorly understood (USFWS, 2011b). Herbicide use, invasive species, pathogens, conversion to croplands, and habitat fragmentation have resulted in loss and degradation of preferred tallgrass prairie habitat and have been suggested as possible causes of decline for both species (Selby, 2010; **Appendix L**).

Critical habitat has been designated for both species in Deuel County, South Dakota, on lands located both inside and outside of their current estimated geographical range (USFWS, 2015a, 2015b, 2015c). The designation was based on the presence of physical or biological features that support life-history processes essential for the conservation of these species and occupancy at the time of listing.

One parcel of land designated as critical habitat for the Dakota skipper occurs approximately 1.5 miles northeast of the Project Area in South Dakota. This parcel is designated as "DS SD Unit 05" and includes approximately 120 acres (USFWS, 2015a, 2015b, 2015c; **Appendix L**). This same parcel is also included in the critical habitat for Poweshiek skipperling and designated as "PS SD Unit 05" (USFWS, 2015a, 2015b, 2015c; **Appendix L**).

A historical record from the SDGFP for both the Poweshiek skipperling and Dakota skipper exists approximately 12 miles north of the Project Area. Both uplands and wetlands in the Project Area have been invaded by non-native cool season grasses, while parcels with native prairie grasses are largely associated with relatively low diversity Conservation Reserve Program plantings and/or grazing or haying activities limiting vegetation stand diversity for native plants. Additionally, native prairie flowers that may support these butterfly species, such as *Echinacea* spp., are not abundant in the remnant native prairie grasses.

A habitat assessment was conducted for the Dakota skipper and the Poweshiek skipperling to identify areas of potential habitat within the Project Area. Biologists performed a desktop analysis to identify areas that could provide suitable butterfly habitat, which for these species is native tallgrass prairies. Areas that were deemed to potentially be native tallgrass prairie were designated as "Field Focus Areas" and were further assessed during field survey. Sixty-nine Field Focus Areas were identified and assessed between November 2 and 4, 2022 and July 31 and August 1, 2023. From the field evaluation, 63 of the 69 Field Focus Areas were determined to contain unsuitable habitat for Dakota skipper or the Poweshiek skipperling. Many of the unsuitable focus areas were either intensely grazed, hayed, or lacked native grass species. Six Field Focus Areas were identified as containing suitable habitat for either the Dakota skipper or the Poweshiek skipperling. No Poweshiek skipperlings or Dakota skippers were observed during any of the site visits or the butterfly habitat assessment surveys (**Appendix L**).

A low potential exists for these protected species to occur in the Project Area. This assessment is based on historical records of occurrence, presence of grasslands, the location of designated critical habitat relative to the Project Area, and grassland conversions reducing the amount of suitable habitat for both butterfly species, and grazing/haying activities.

Monarch Butterfly

The monarch butterfly is listed as a candidate species under the ESA. As such, it is not currently afforded protections. The monarch butterfly is a migrating insect whose range extends throughout most of the continental U.S. This butterfly can live in a variety of habitats, including prairies, savannas, rights-of-way, and field edges with abundant flowering plants. Although the monarch can live in many different habitats, their larval stage requires a diet of only milkweed (*Asclepias*) species. Because of this reliance on milkweed, habitats with milkweed are more likely to have monarch butterflies present, and the species range cannot extend beyond the range

of milkweed. The summer range of monarch butterflies extends into Canada, the northern edge of the milkweed range, and the species then migrates to overwinter in Mexico or the California coast. Due to suitable habitat being present within the Project Area, the monarch butterfly is likely to be present.

Whooping Crane
The whooping crane was listed as endangered under the ESA in 1970 after its population plummeted due to hunting and habitat loss. Today, this migratory bird only has four populations left, with these populations all being geographically separated. The largest population, the Aransas/Wood Buffalo population, nests in prairie wetlands in Saskatchewan, Canada and migrates south to winter on the gulf coast of Texas. During this migration, whooping cranes temporarily occur in South Dakota during the spring and fall. This Aransas/Wood Buffalo population is the only population that is naturally occurring and does not need human intervention. The other three populations are experimental or introduced populations, only one of which migrates. The Aransas/Wood Buffalo population migrates within a similar corridor consistently, which is considered the whooping crane corridor (USGS, 2018). The whooping crane corridor area accounts for 95% of whooping crane sightings. The Project Area is not located within the USFWS whooping crane migration corridor, which is located approximately 85 miles west of the Project Area (**Appendix G**). No whooping cranes were observed during any of the site visits or throughout the multiple years of avian surveys. Due to being outside of the migratory corridor, whooping cranes are unlikely to occur in the Project Area.

9.3.2.2 State-listed Species

A Natural Heritage Database request was sent to the SDGFP on February 7, 2023 for the Project Area. Based on the information received from the SDGFP, four state-listed species may occur in Deuel County. Three of those species are based on USFWS and SDGFP county distribution lists and the fourth, the osprey (*Pandion haliaetus*), is based on the species' known distribution and range mapping. All four species may potentially occur in the Project Area. These four species are the whooping crane (also federally endangered), osprey, banded killifish (*Fundulus diaphanous),* and northern redbelly dace (*Chrosomus eos*). The two aquatic species (banded killifish, and northern redbelly dace) are addressed in Section 10.1.2.

Whooping Crane
Please refer to Section 9.3.2.1 for discussion on Whooping Crane.

Osprey
The state-threatened osprey is a piscivorous raptor typically found near freshwater and salt-water habitats, including coastlines, inland lakes, and rivers. Ospreys build large nests that contain sticks, lined with bark, sod, grasses, and vines atop dead trees or artificial structures. Ospreys occurred historically in the region but declined between the 1950s and the 1970s from the effects of pesticides. Ospreys have been recorded in the general vicinity of the Project Area, mostly during migration. There are several recent observations, including 2023 at Lake Poinsett (17 miles from the Project Area), 2021 at Oakwood Lakes (18 miles) and 2017 at Lake Hendricks (7 miles; eBird 2023). It is possible that migrating ospreys may forage in the Project Area, utilizing forested areas along riparian corridors, open waterbodies, and open wetlands. Suitable breeding and foraging habitat for the species is limited and there are no recorded sightings in Deuel

County within the last ten years. No osprey were observed during any of the site visits or throughout the multiple years of avian surveys; therefore, it is unlikely to occur within the Project Area.

9.3.3 Wildlife Impacts/Mitigation

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

Construction crews will be instructed to avoid disturbing wildlife, and direct mortalities are unlikely to impact wildlife populations. BMPs will be practiced by construction personnel to reduce attractants to scavengers and potential nest predators. Following construction, wildlife species are expected to habituate to routine O&M activities.

Birds

Wind energy and transmission facilities may result in direct mortality of birds from collisions and indirect impacts from avoidance, habitat disruption, and displacement of birds. Bird species such as raptors (hawks, eagles, falcons, and owls) appear to be at higher risk of collisions with wind turbines, although the reason is not fully understood (National Wind Coordinating Collaborative ["NWCC"], 2004). Fatality rates of birds at wind energy facilities likely depend on amount of bird use, vegetation, and other physical and biological characteristics of the facility and surrounding area.

Studies within grassland and shrub-steppe habitat have documented decreased densities of and decreased avoidance by grassland songbirds and others as a function of distance to wind turbines and roads. These studies suggest birds adapt (habituate) to the presence of wind energy facilities. Although it is anticipated that some avian mortality could result due to the presence of wind energy facilities, the impacts should be within the average range of mortality based on documented events at other facilities within similar environments.

To minimize any potential avian impacts, the Gen-Tie Line will be designed in accordance with Avian Power Line Interaction Committee ("APLIC") standards and was sited with the minimum length necessary to connect the Collector Substation and Interconnection Switchyard.

9.4 Federally Listed Species

Northern Long-Eared Bat

Summer roosting habitat is present within the Project Area; however, it is in small quantities and the USFWS current range is limited in the Project vicinity (**Appendix J**). Habitat features, including hibernacula such as caves and abandoned mines, are lacking in the Project Area, and distance to such features makes the likelihood of NLEBs being present very low. Although WNS is the primary threat to NLEB populations, impacts of wind energy facilities on bat species can also be a concern. With the minimization methods and practices outlined in Section 9.4.1.2, and because NLEBs are not likely to be present within the Project Area, there are no anticipated impacts to NLEBs.

Tricolored Bat
Habitat features, including hibernacula such as caves and abandoned mines, are lacking in the Project Area, and distance to such features makes the likelihood of tricolored bats being present very low. Although WNS is the primary threat to tricolored bat populations, impacts of wind energy facilities on bat species can also be a concern. Similar to northern long-eared bats, while wind energy facilities are not the top stressor of tricolored bats, they are a contributing stressor that, when combined with the impacts of WNS, can cause further declines in the populations (USFWS, 2022d). With the minimization methods and practices outlined in Section 9.4.1.2, and because tricolored bats are not likely to be present within the Project Area, there are no anticipated impacts to the tricolored bat.

Rufa Red-Knot
No suitable rufa red knot habitat was observed in the Project Area during the numerous site visits. Rufa red knots are unlikely to breed within the Project Area, but the species could potentially migrate through the Project Area, although stopover during migration is not likely due to lack of habitat. No impacts to the rufa red knot are anticipated from the Project.

Dakota Skipper and Poweshiek Skipperling
Based on the location of designated critical habitat relative to the Project Area, historical records within the Project Area, and limited suitable habitat, a low potential exists for these species to occur in the Project Area. Protected butterfly habitat assessments were conducted within the Project Area in 2023 (**Appendix L**). Six areas of potential suitable habitat were identified. Based on current design, the edge of a low probability habitat will be temporarily impacted by a turbine workspace. Considering these factors, no permanent impacts to the Dakota skipper and Poweshiek skipperling are anticipated from the Project.

Furthermore, no evidence exists to suggest that butterfly mortality is a concern at commissioned wind energy facilities due to collisions with turbines (Grealey and Stephenson, 2007). Studies on this topic have suggested the wind speeds and patterns associated with operating turbines will likely not create a collision issue with butterflies, resulting in a low probability of direct impacts. Since most potential habitat in the region has been impacted by grassland conversions and invasion by cool season species, minor indirect impacts may occur due to loss of habitat for these species. Impacts to these species can be avoided through siting to avoid work in suitable habitat, restricting work to within designated areas, salvaging topsoil for reuse at the derived locations, and reclaiming native habitat where possible upon completion of construction.

Monarch Butterfly
There is suitable habitat for the monarch butterfly within the Project Area and there have been sightings within the surrounding area (iNaturalist, 2023). It is likely for this species to occur in the Project Area, however, this species is not currently protected. Regardless, as noted with respect to the Dakota skipper and Poweshiek skipperling above, there is no evidence to suggest that butterfly mortality is a concern at commissioned wind energy facilities.

Whooping Crane
The Project Area is not located within the USFWS whooping crane migration corridor, which is located approximately 85 miles west of the Project Area; thus, whooping cranes are unlikely to occur in the Project Area and no impacts to whooping cranes are anticipated from the Project.

9.4.1 State-listed Species

Osprey

Ospreys have been recorded in the general vicinity of the Project Area, mostly during migration. However, no sightings have been reported in Deuel County in the last ten years. It is possible that migrating osprey may forage in the Project Area, utilizing forested areas along riparian corridors, open waterbodies, and open wetlands. This species is unlikely to occur in the Project Area due to the limited amount of suitable breeding and foraging habitat and the lack of recorded sightings in Deuel County and the Project Area. Direct impacts to this species include potential collision with wind turbines, although, as discussed in Section 9.3.3 above, bird fatalities due to collisions with wind energy facilities is unlikely and should be similar to the average mortality rates in the U.S. at wind energy facilities within similar landscapes.

9.4.2 Avoidance, Minimization, and Mitigation Measures

Project Facilities have been sited to avoid or minimize impacts to federally listed and other special-status wildlife species. South Deuel Wind will continue to implement applicable avoidance and minimization measures. South Deuel Wind will construct and operate the Project in accordance with federal and state requirements.

South Deuel Wind prepared a Bird and Bat Conservation Strategy ("BBCS") (**Appendix K**) in accordance with the USFWS WEG that will be implemented to minimize impacts to avian and bat species during construction and operation of the Project. As stated in the BBCS, the following impact minimization and avoidance measures will be implemented for the Project.

Design minimization and avoidance measures include:

- All permanent impacts to protected lands, USFWS critical habitat, and conservation easements will be avoided, to the extent practicable. Permanent impacts to wetlands will be minimized to the extent practicable;
- Wind turbines and associated facilities for the Project will be sited with consideration for the topographic and environmental characteristics of the site, efficiency of selected turbine models, and minimal impacts to area residents;
- As recommended in the USFWS' NLEB Interim Guidance (USFWS, 2023b), all turbines will be sited more than 1,000 ft (305 m) from the edge of connected patches of forested habitat to avoid potential impacts to bats, including NLEBs and tricolored bats, during the summer;
- The Project's location in a predominantly agricultural landscape avoids the following habitat features: (1) habitats associated with any federally listed wildlife or plant species, (2) bird movement corridors, (3) landscape features that attract raptors, (4) bat hibernacula or maternity/nursery colonies, and (5) concentrated bird and/or bat use areas;
- All turbines will be sited outside of native habitat (including unbroken grasslands, forested habitat, and wetlands). Native habitat will be avoided when possible and previously disturbed lands (including existing roadways) will be used, where practical, to avoid wildlife habitat fragmentation;
- Turbines will be sited out of grassland habitat with records of Dakota skipper and Poweshiek skipperling, and any habitat potentially suitable for these species recorded during the Protected Butterfly Species Habitat Assessment (**Appendix L**);

- Several alternative turbine locations were developed to provide an opportunity to avoid or minimize potential impacts to natural resources and to work around potential issues that may arise during Project development;
- Nest setbacks, which include 1 mile for eagles, 520 meters for red-tailed hawks, and 400 meters for great horned owls, and unidentified raptors, will be used;
- Turbine towers will be designed and constructed to discourage bird nesting and wildlife attraction;
- The Project will employ unguyed, tubular towers with slow-rotating, upwind rotors;
- Aviation hazard lighting will be minimized to Federal Aviation Administration requirements and strobed, minimum-intensity red lights will be installed on Project turbines, as recommended by the FAA and in the WEG (USFWS, 2012), to avoid attracting birds or bats;
- South Deuel Wind will also employ an ADLS at the Project, subject to FAA approval;
- Hoods/shields will be installed on exterior lights at the O&M Facility and Collector Substation to minimize skyward light;
- Turbine doors will not have exterior lights installed at the entrance;
- South Deuel Wind will install collector circuits underground; therefore, no bird collision or electrocution risks would apply to the buried lines;
- In the event the 34.5kV electrical collection system require overhead construction, the structures will be designed and constructed in accordance with the APLIC suggested practices to minimize potential avian electrocution risk (APLIC, 2006); and
- If an avian collision risk is identified along the Gen-Tie Line during line operation, applicable measures to minimize the potential for bird collisions will be implemented in accordance with APLIC's suggested measures to increase the visibility of the smaller-diameter shield wire (e.g., flight diverters; APLIC, 2012).

Construction minimization and avoidance measures include:

- Prior to construction, all supervisory construction personnel will be instructed on the BBCS and wildlife resource protection measures, including: (1) applicable federal and state laws (e.g., those that prohibit animal collection or removal) and (2) the importance of these resources and the purpose and necessity of protecting them, and ensure this information is disseminated to applicable contractor personnel, including the correct reporting procedures;
- Construction personnel will be trained on protected wildlife species and avoidance areas during construction;
- A SWPPP will be prepared and implemented, as required by the EPA or relevant local authority; the plan will include standard sediment control devices (e.g., silt fences, straw bales, netting, soil stabilizers, check dams) to minimize soil erosion during and after construction;
- Prior to construction, field surveys will be conducted to determine the presence of any jurisdictional wetlands or streams within the footprint of each turbine location and ancillary facilities; during construction, South Deuel Wind will comply with applicable federal regulations protecting waters of the U.S., as listed in Title 33 CFR Part 323;
- Speed limits will be set to ensure safe and efficient traffic flow; signs will be placed along roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information;

- Following construction, all disturbed areas will be restored to surrounding grade, reclaimed with soils of similar physical and chemical properties, and seeded with vegetation consistent with the surrounding land use; and
- All herbicide and pesticide mixing and applications will be conducted in accordance with all federal, state, and local laws and regulations, as well as the specific product's label.

Operation minimization and avoidance measures include:

- All non-restricted carrion discovered on-site during regular maintenance activities may be removed and disposed of in an appropriate manner to avoid attracting eagles and other raptors; birds and bats discovered on-site will be addressed in conformance with the Project's incidental reporting process and the post-construction monitoring protocol in Section 5 of the BBCS (**Appendix K**);
- In addition to carrion removal, South Deuel Wind will encourage landowners with livestock operations in and adjacent to the Project Area, if necessary, to clear livestock carcasses regularly and expediently to avoid attracting eagles and other raptors to the Project Area;
- Turbines will be feathered below cut-in, 3.0 meters per second (m/s; 6.7 miles per hour ["mph"]) from sunset to sunrise April 1 to July 14 and October 16 to October 31 and 5.0 m per second (m/s; 11.2 mph) from sunset to sunrise July 15 to October 15 to minimize impacts to bat species and avoid impacts to the NLEB and tricolored bat. This feathering will reduce the speed that blades will rotate when the turbines are not generating electricity in order to minimize the risk of bat-blade collisions.
- Monitoring and adaptive management will be implemented as described in greater detail in Sections 5 and 6 of the BBCS (**Appendix K**) to ensure the effectiveness of the avoidance and minimization strategies incorporated into the Project.

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

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

10.1 Existing Aquatic Ecosystem

10.1.1 Surface Waters and Wetland Resources

Surface waters are described in Section 8.2. The Project Area is located in the Lac qui Parle and Upper Minnesota Sub-basins of the Minnesota Basin drainage system, and the Middle Big Sioux Sub-basin of the Big Sioux Basin drainage system. Approximately 2,218 acres of NWI wetlands occur within the Project Area (approximately 4.5% of the Project Area). The wetlands in the Project Area consist of freshwater emergent wetlands, freshwater ponds, riverine, lake, and freshwater forested/shrub wetland. Aquatic biota present within the waterways of the Project Area are diverse and representative of the area.

10.1.2 Federal and State Special-Status Aquatic Species

Federally listed threatened or endangered aquatic species could potentially occur within the Project Area (**Table 10.1.2**). Based on habitats found within the Project Area, three aquatic species have the potential to occur in the Project Area during some portion of the year: the federally endangered Topeka shiner, the state-threatened banded killifish, and the state-threatened northern redbelly dace (SDGFP, 2022b; USFWS, 2023).

Table 10.1.2 Federal and State Special-Status Species with Potential to Occur in the Project Area

Species	Federal Status	State Status	Potential to Occur
Topeka shiner	Endangered	--	Likely. Topeka shiners live in small to mid-size prairie streams in the central U.S. where they are usually found in pool and run areas. Suitable streams tend to have good water quality and cool to moderate temperatures. They have been documented in the Peg Munky Run and Hidewood Creek, which intersect the Project Area.
Banded killifish	--	Endangered	Unlikely. Limited to James, Vermillion, and Big Sioux River Basins, and to the northeastern lakes of South Dakota, which are outside the Project Area.
Northern redbelly dace	--	Threatened	Unlikely. The preferred habitat is a series of beaver ponds that are filled with a constant supply of cool, spring water with enough oxygen for the fish.

Topeka Shiner

The Topeka shiner is a federally endangered species of fish that typically occurs in small, prairie streams with sand or gravel substrates with excellent water quality (Shearer, 2003). Additionally, some documented Topeka shiner locations in South Dakota have been reported in degraded streams with sloughs connected to occupied streams, backwater areas and silt substrates (Schmidt, 2003; Wall et al., 2004; USFWS, 2009). In eastern South Dakota, the Topeka shiner is known to occur in the Vermillion, Big Sioux, and James River Basins (SDGFP, 2003). Topeka shiners have been documented in the southwest corner of Deuel County in Peg Munky Run and Hidewood Creek (SDGFP, 2003). Because the upper reaches of Hidewood Creek extend into the Project Area, the Topeka shiner has the potential to occur in the reaches of this creek in the Project Area.

Banded Killifish

The banded killifish is a state-endangered fish species that prefers quiet, shallow lakes and ponds with abundant aquatic vegetation and sandy-gravel substrates (NatureServe, 2023). The current known distribution of the banded killifish in South Dakota is limited to the James, Vermillion, and Big Sioux River Basins, and to the northeastern lakes of South Dakota (SDGFP, 2023; Fuller

and Neilson, 2018). These areas are outside the Project Area, making the potential occurrence for this species in the Project Area unlikely.

Northern Redbelly Dace

The northern redbelly dace is a state-threatened fish species, with a strong preference for spring-fed streams that are sluggish and have dense vegetation; however, it also can be found in small, spring-fed lakes and bogs (NatureServe, 2023). The preferred habitat can be described as a series of beaver ponds that are filled with a constant supply of cool, spring water with enough oxygen for the fish. The cover and vegetation provided by logs and brush supply areas of shade, as well as cover to avoid predators and to ambush prey (Cunningham and Hickey, 1995). Based on the northern redbelly dace's associated habitats and the type and size of the perennial water sources within the Project Area, these waterbodies may provide suitable habitat for this species.

The northern redbelly dace once existed south of the Project Area between Clear Lake and Monighan Creek; however, no historical documentation of this species occurs within the Project Area. Even though some of the perennial streams crossing the Project Area may be suitable habitat, it is unlikely that the northern redbelly dace will be within the Project Area due to no historical documentation of this species in the region.

10.2 Aquatic Ecosystem Impacts/Mitigation

10.2.1 Surface Waters and Wetland Resources

As described in Section 9.2.2, impacts to wetlands and waterways are expected to be minimal. The primary potential for impact to aquatic ecosystems would be from increased sedimentation or increased total suspended solids due to soil erosion from the Project during construction. In general, surficial soils on flat areas are less prone to erosion than soils in sloped areas. Construction on or adjacent to steep slope areas can render soils unstable, accelerate natural erosion processes, and cause slope failure.

Project Area slope ranges from 0 to 40%, with the majority of slope at 1 to 6%. Care will be taken to avoid or limit excavation in steep slope areas. Wind turbines are typically located at higher elevations to maximize wind exposure, minimize wind obstructions, and avoid steep slopes for foundation installation. The access road locations generally avoid steep slopes as well. Similar efforts apply to the location of the underground collector circuits to avoid crossing steep ravines, however, limited trenching in steep slopes may be required, although it will be limited to the extent practicable by siting and directional boring of these areas. The Gen-Tie Line will span any wetlands or waterways in its route. During construction, BMPs will be implemented to help avoid impacts to drainageways and streams from sediment runoff from exposed soils during precipitation events. Because erosion and sediment control BMPs will be implemented for construction and operation of the Project, no impacts to aquatic ecosystems are expected.

10.2.2 Federal and State Special-Status Aquatic Species

It is unlikely that the Topeka shiner, banded killifish, or northern redbelly dace will be directly or indirectly affected by the construction and operation activities of the Project. South Deuel Wind will avoid direct impacts to streams and BMPs will be implemented to control sedimentation and erosion during construction to prevent downstream water quality impacts. If the final Project

Layout were to necessitate unavoidable work within suitable habitat, South Deuel Wind will assess potential presence to avoid the species or coordinate with the appropriate agency.

11. Land Use (ARSD 20:10:22:18)

ARSD 20:10:22:18. Land use. *The applicant shall provide the following information concerning present and anticipated use or condition of the land:*
(1) A map or maps drawn to scale of the plant, wind energy, or transmission site identifying existing land use according to the following classification system:
(a) Land used primarily for row and nonrow crops in rotation;
(b) Irrigated lands;
(c) Pasturelands and rangelands;
(d) Haylands;
(e) Undisturbed native grasslands;
(f) Existing and potential extractive nonrenewable resources;
(g) Other major industries;
(h) Rural residences and farmsteads, family farms, and ranches;
(i) Residential;
(j) Public, commercial, and institutional use;
(k) Municipal water supply and water sources for organized rural water systems; and
(l) Noise sensitive land uses;
(2) Identification of the number of persons and homes which will be displaced by the location of the proposed facility;
(3) An analysis of the compatibility of the proposed facility with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming; and
(4) A general analysis of the effects of the proposed facility and associated facilities on land uses and the planned measures to ameliorate adverse impacts.

11.1 Land Use

11.1.1 Existing Land Use

Land use within the Project Area is predominantly agricultural, with land cover consisting of a mix of cultivated crops and herbaceous vegetation. Analyses from the grassland assessment documented grassland areas including both native/unbroken and broken/introduced species (**Appendix F**). Limited unbroken grassland of approximately 335 acres, or 1 percent of the Project Area, was identified. The remaining land cover in the Project Area consists of emergent herbaceous wetlands; developed land, open space; hay/pastureland; open water; deciduous forest; developed, low intensity; developed, medium intensity; mixed forest; woody wetlands; developed, high intensity; and shrub/scrub vegetation.

Occupied farm sites and rural residences occur within the Project Area, and other scattered rural residences are adjacent to, but outside of, the Project Area. Occupied farm sites and rural residence locations were originally identified using satellite imagery, followed by a field verification of these residences conducted by South Deuel Wind in Q3 2017. A second field verification was conducted in November 2018, during which no additional occupied residences were identified. Another field verification was performed in May 2023 by Stantec, ensuring

ongoing accuracy and completeness. In addition to these field verifications, South Deuel Wind had a local surveyor identify dwellings in January 2024. Furthermore, South Deuel Wind contacted Deuel County's zoning department in May 2024 and received a list of all building permits issued for occupied residences within 2023 and 2024. Upon review, no additional occupied residences were presented or are proposed at the time of this submittal. Land use in the Project Area based on the classification system specified in ARSD 20:10:22:18(1) is shown in Figure 12 in **Appendix A**. The following land use classifications occur within the Project Area:

- Land used primarily for row and nonrow crops in rotation;
- Pasturelands and rangelands;
- Haylands;
- Potentially unbroken grasslands;
- Rural residences and farmsteads, family farms, and ranches;
- Residential; and
- Noise sensitive land uses.

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

- Irrigated lands;
- Existing and potential extractive nonrenewable resources;
- Other major industries;
- Public, commercial, and institutional use; and
- Municipal water supply and water sources for organized rural water systems.

In Deuel County in 2022, approximately 73% of the land in farms was cropland, with corn and soybeans being the two most common crops (USDA, 2024). Total cropland in Deuel County increased by 13% from 223,776 acres in 2017 to 253,106 in 2022 (USDA, 2024). Specific acreages of different crops within the Project Area, which change from year to year, are not available. In Deuel County in 2022, approximately 26% of the land in farms was pastureland (USDA, 2024). Pastureland decreased 31% from 97,261 acres in 2017 to 65,078 acres in 2022.

11.1.2 Land Use Impacts/Mitigation

Construction of the Project will result in conversion of a small portion of the land within the Project Area. **Table 6** provides a summary of the temporary and long-term ground disturbance impacts associated with the Project. Approximately 1,058 acres of temporary ground disturbance impact is expected during construction of the Project, approximately 51 of which will be long-term for the operational life of the Project (approximately 0.1 percent of the total land within the Project Area) to host aboveground Project Facilities. Following completion of construction, all temporary construction workspaces will be cleaned up and restored to pre-construction conditions pursuant to the lease and easement agreements, which primarily consist of cultivated croplands and pastureland/grassland.

As discussed in Section 18, the Project will be decommissioned after the end of its operational life. After decommissioning for the Project is complete, no irreversible changes to land use will remain.

Eighty-one residences are within the Project Area. No displacement of residences or businesses will occur due to construction of the Project.

11.2 Public Lands and Facilities

Public lands within the Project Area are shown in Figure 13 in **Appendix A**. Public facilities within the Project Area are shown in Figure 14 in **Appendix A**.

11.2.1 Existing Public Lands and Conservation Easements

11.2.1.1 USFWS Lands

USFWS conservation easements are an agreement between the U.S. and landowners to protect restored and existing wetlands and grasslands. The USFWS, on behalf of the U.S., pays willing landowners a percentage of their agricultural or wetland property's fair market value to preserve these areas from development or agricultural production. This agreement can either be in perpetuity or a 30-year agreement and is tied to the land; it is not nullified by selling or buying of the land. No permanent structures are allowed on the land that is subject to a conservation easement, although below ground alterations may be allowed in some areas (USFWS, 2022a).

Based on correspondence with USFWS and conservation easement database searches, several federally administered, state-managed, and private conservation lands occur in the Project Area (Conservation Biology Institute, 2022). The USFWS administers approximately 1,211 acres of land defined as Deuel County Waterfowl Production Areas ("WPAs") within the Project Area. Project infrastructure is sited within three of these parcels. The Project coordinated with the USFWS Madison Wetland Management District to map the boundaries of the easements within the parcels. There is one parcel of the Dakota Tallgrass Prairie Wildlife Management Area 145 ("WMA") in the Project Area. Project Facilities have been sited to avoid federal conservation easements. The two different conservation easements that are managed by the USFWS in the Project Area are identified in **Table 11.2.1.1**.

Table 11.2.1.1 Federally Administered Lands Within the Project Area

Name	Administrating Agency	Acreage
Deuel County Waterfowl Production Area	USFWS	1211.3
Dakota Tallgrass Prairie Wildlife Management Area 145	USFWS	0.2

11.2.1.2 SDGFP Areas

State-owned lands totaling 2 acres are located within the Project Area, including portions of two Game Production Areas ("GPAs"): Singsaas State Conservation Area and Fox Lake State Recreation Area. The GPAs are managed by SDGFP for the maintenance and protection of wildlife species, specifically for hunting opportunities, including big game, small game, and waterfowl; however, non-game wildlife and upland birds also utilize these areas (SDGFP, 2023a). Project Facilities have been sited to avoid state-owned lands. There is one WIHA located

on privately-owned property participating in the Project that is anticipated to host Project Facilities. The WIHA is southeast of the intersection of 187th Street and 478th Avenue.

11.2.1.3 Public Facilities

No schools or churches occur within the Project Area, although several schools and churches are located just outside the Project Area (Figure 14 in **Appendix A**). One cemetery occurs within the Project Area, approximately 0.5 miles west of the town of Brandt.

Other than the federal- and state-administered lands discussed in Sections 11.2.1.1 and 11.2.1.2, no parks or recreation areas exist within or directly adjacent to the Project Area. Nordquist, Sevenson, Mundahl, Fox Lake, and Quail WPAs are located to the north, south, and east of the Project Area.

11.2.2 Public Lands and Facilities Impacts/Mitigation

South Deuel Wind coordinated with the USFWS regarding the boundaries of the USFWS wetland, grassland, and conservation easements shown in Figure 13 in **Appendix A**. Within the parcels containing wetland easements, the easement area is defined and is generally a subset of the parcels. Project Facilities have been sited to avoid federal conservation easements and state-owned lands, and thus, no direct impacts to these easement areas will occur. In addition, no Project Facilities are sited within the USFWS WPAs or SDGFP GPAs. Project Facilities may be sited on the property subject to the WIHA agreement with SDGFP. If Project Facilities are constructed on the property, the landowner has advised that the WIHA agreement will be modified or terminated as needed to accommodate the Project.

11.3 Sound

A Noise Analysis for the Project is provided in **Appendix M**.

11.3.1 Existing Sound Levels and Regulatory Framework

The Project Area is located entirely within Deuel County. The Project Area contains cropland, grassland, and rural residences scattered throughout. Farming activities and vehicular traffic are assumed to be the largest contributors to existing sound levels, although ambient sound measurements have not been conducted for the Project Area.

Acoustical Terminology

The term “sound level” is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level. The sound power level is the acoustical energy emitted by a sound source and is a quantity that is not affected by the surrounding environment. The acoustical energy produced by a source propagates through the air as pressure fluctuations. These pressure fluctuations are what human ears hear and microphones measure.

The human ear is sensitive primarily to the level (loudness) of a noise (sound), but also to its pitch (frequency). The human ear can detect an incredibly large range of sound pressure changes, from approximately 20 micropascals (the “threshold of human hearing”) to approximately 20

pascals (the “threshold of pain”). The frequency of a sound is the rate at which it fluctuates in time, expressed in Hertz (“Hz”), or cycles per second.

The compressive decibel scale is used to make the expression of loudness of a sound more manageable for discussion. Sound is quantified using the decibel, which can be weighted and expressed in different ways. The most common weighting scale used in environmental noise analysis and regulation is the A-weighted decibel (“dBA”). This weighting mechanism emulates the human ear’s varying sensitivity to the frequency of sound. The human ear is much less sensitive to low frequencies, most sensitive to approximately 1,000 Hz, and less sensitive to high frequencies. The A-weighted level represents the sum of the energy across the entire “audible frequency spectrum” (20 to 20,000 Hz), weighted by frequency as the human ear does. This incorporates the frequencies where wind turbines produce most of their sound (250 to 1,250 Hz). This is a common range for other sources as well, including transportation, industrial, and agricultural equipment. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in **Table 11.3.1**.

Table 11.3.1 Typical Sound Pressure Levels Associated with Common Sound Sources			
Sound Pressure Level (dBA)	**Subjective Evaluation**	**Environment**	
		Outdoor	**Indoor**
140	Deafening	Jet aircraft at 75 feet	--
130	Threshold of pain	Jet aircraft during takeoff at 300 feet	--
120	Threshold of feeling	Elevated train	Hard rock band
110	--	Jet flyover at 1,000 feet	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 feet, auto horn at 10 feet, crowd noise at football game	--
90	--	Propeller plane flyover at 1,000 feet, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 feet	Inside automobile at high speed, garbage disposal
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 feet, near highway traffic	General office
50	Quiet	--	Private office
40	--	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV or stereo)
20	--	Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

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

Turbines do not emit much high frequency noise, and that which is emitted is attenuated by the atmosphere before it reaches even the closest residences. Sounds in the environment vary with time, and the two sound level metrics that are commonly reported in community noise monitoring are:

- L_{90}, which is the sound level in dBA exceeded 90% of the time during a measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the "residual" sound level, which is the sound level observed when there are no obvious nearby intermittent noise sources.

- L_{eq}, the equivalent level, is the level of a hypothetical steady sound that would have the same energy (i.e., the same time-averaged mean square sound pressure) as the actual fluctuating sound observed during a time interval. The equivalent level is the most commonly used metric for predicting, regulating, and measuring wind turbine noise. The equivalent level is designated L_{eq} and is commonly A-weighted. The equivalent level represents the energy average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with time-averaged mean square sound pressure values, the L_{eq} is mostly determined by occasional loud noises.

Noise Regulations
Noise impacts are not currently regulated in applicable state or federal law. Deuel County has adopted a zoning ordinance that limits sound levels of wind energy systems. Specifically, Section 1215.03(13)(a) of the Ordinance provides:

> Noise level for non-participating residences shall not exceed 45 dBA, average A-Weighted Sound pressure. The noise level is to be measured at the perimeter of existing non-participating residences.

Noise Analysis
A Noise Analysis of all three turbine models under consideration was completed for the Project and is provided in **Appendix M**. The Noise Analysis assessed the potential impact of the Project and confirmed compliance with the Ordinance.

11.3.2 Sound Impacts/Mitigation

Construction and Decommissioning
Potential sound associated with the construction and decommissioning of the Project includes site clearing, grading, foundation work, and turbine installation. All reasonable efforts will be made to minimize the impact of sound resulting from construction activities. Sounds generated by construction activities are typically exempt from state and local noise oversight if they occur within weekday, daytime periods. While most heavy construction work is anticipated to occur during daylight hours, some construction operations may be conducted outside of normal working hours. In these cases, the necessary construction efforts generally require activities that must be completed in their entirety once initiated (i.e., pouring concrete). All construction- and decommissioning-related sound producing activities will be undertaken to comply with applicable state and county regulatory obligations and ordinances. To minimize the impact of construction sound, the Project will limit any necessary nighttime work near residences to quiet activities such as finishing, maintain equipment to manufacturers' specifications, and minimize backing up on site of delivery trucks. The list of construction equipment that may be used on the Project, its maximum sound level (L_{max}) expected at 50 feet, the typical duration a particular piece of equipment is used in any one-hour period (Usage Factor), and the resulting hourly equivalent sound level ($L_{eq\ (one\text{-}hour)}$) for the piece of equipment are provided in **Table 11.3.2**.

Table 11.3.2 Sound Source Characteristics of Construction Equipment			
Equipment	**L_{max} Sound Level at 50 ft (dBA)**	**Usage Factor (%)**	**$L_{eq(1\ Hr)}$ Sound Level at 50 ft (dBA)**
Backhoe	82	40	77.6
Belly Dump Truck	88	40	84.0
Bucket Truck	82	20	74.7
Cable Layer	70	50	67.0
Chain Saw	91	20	83.7
Concrete Truck	88	20	81.4
Crawler Crane	89	16	80.6
Dozer	86	40	81.7
Drill Rig	86	20	79.1
Dump Truck	81	40	76.5
Excavator	85	40	80.7
Feller Buncher	89	40	85.0
Forklift	69	40	65.0
Grapple Loader	83	40	79.1
Horizontal Drill	88	25	82.0
Log Truck	78	40	74.3
Moto Grader	89	40	85.0
Roller	84	40	80.0
RT Crane	89	16	80.6
Seed Drill	83	50	80.0
Semi-Trucks	78	40	74.3
Skid Steer	83	40	79.1
Track Hoe	82	40	77.6
Tractor Trailer	78	40	74.3
Trencher	83	50	80.4
Truck Crane	87	16	80.6

Operation

The sound commonly associated with a wind turbine is described as a rhythmic “whoosh” caused by aerodynamic processes. This sound is created as air flow interacts with the surface of rotor blades. The rhythmic fluctuations of the overall sound levels are less perceivable the farther one gets from the turbine. Additionally, multiple turbines operating at the same time will create the whooshing sound at different times. These non-synchronized sounds will blend to create a more constant sound to an observer at most distances from the turbines. Another phenomenon that reduces perceivable noise from turbines is the wind itself. Higher wind speed produces noise that tends to mask (or drown out) the sounds created by wind turbines.

Acoustical Model Inputs

Noise levels from the Project were predicted using the modeling method set forth in International Organization for Standardization Standard 9613-2:2024: Attenuation of Sound During Propagation Outdoors. The method was implemented using the SoundPLAN v8.2 acoustical

modeling program. Figure 4-1 in **Appendix M** shows a representative three-dimensional view of the SoundPLAN model of the Project.

In the SoundPLAN model, each turbine was represented as an acoustical point source located at its hub height, which is 98 m above the ground for the GE 3.8-154 and V163-4.5 turbine models, 97.5 m for the SG 4.4-164 turbine model, and 3 m for the main power transformers. The ground elevation for each turbine location was determined using Digital Elevation Model data from the USGS National Elevation Dataset. Noise levels from the full, normal, and continuous operation of the Project were predicted at each non-participating and participating residence located within 1.25 miles of any Project noise source. The main power transformers (two 150 MVA units) in the Collector Substation were assumed to be operating fully. For the analysis, all 73 proposed turbine locations were studied for the GE 3.8-154 even though only a maximum of 68 turbines will be constructed. The SG and Vestas turbine models do not include proposed turbine locations 69 and 76 to match the corresponding Shadow Flicker Analysis prepared for the Project. All turbine models at all proposed turbine locations can be constructed in compliance with Deuel County's 45 dBA limit at all non-participating residences.

Acoustical Modeling Results

The maximum predicted L_{eq} sound pressure levels at each receiver (the logarithmic addition of sound levels from each frequency from every turbine) are provided in **Appendix M**. The results show a maximum sound level of 45 dBA at non-participating residences. The maximum sound level at participating residences is 48 dBA. These values represent only the noise emitted by the Project and do not include any extraneous noises (traffic, etc.) that could be present during physical noise measurements. No exceedances of the identified regulations from the Project are anticipated, thus, no further mitigation for sound is required.

Cumulative sound from the Project and the Tatanka Ridge Wind Farm was also analyzed. The maximum predicted L_{eq} sound pressure levels at each receiver are provided in **Appendix M**. The results show a maximum sound level of 46 dBA at non-participating residences. The maximum sound level at participating residences is 48 dBA.

Transmission Facility

Construction of the Gen-Tie Line will result in sound levels similar to those of the construction of the wind energy facility. Generally, noise levels during the operation and maintenance of the Gen-Tie Line will be minimal. Transmission conductors can create a noise called corona under certain conditions. Corona noise has a buzzing or crackling sound and is due to corona discharges—the small amount of electricity ionizing the moist air near the conductors. The level of noise depends on conductor conditions, voltage level, and weather conditions. Several other factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, nicks, dust, or water drops can affect a conductor's electrical surface gradient and, therefore, its corona noise emission levels. Measures such as carefully handling the conductor during construction to avoid nicking or scraping or otherwise damaging the surface and using hardware with no sharp edges or points are typically adequate to control corona. The way conductors are arranged on the support poles also affects corona noise production. No additional mitigation measures are required since there will be minimal noise impact from the operation of the Gen-Tie Line.

11.4 Visual Resources

11.4.1 Existing Visual Resources

Cropland, grassland, large open vistas, and gently rolling topography visually dominate the Project Area landscape. Existing structures in the Project Area consist of occupied residences dispersed throughout as well as scattered farm buildings.

Visual impacts to the landscape attributable to the Project depend on the extent to which the existing landscape is already altered from its natural condition, the number of viewers (residents, travelers, visiting recreational users, etc.) within visual range of the area, and the degree of public or agency concern for the quality of the landscape. A total of 81 residences occur within the Project Area. Other scattered rural residences and towns occur near, but outside of, the Project Area (Figure 4 in **Appendix A**). Travelers through the Project Area include local or regional traffic along State Highway 15 and county and township roads. SDGFP public hunting areas (discussed in Section 11.2.1) are also present within the Project Area.

The nearest scenic resources to the Project Area are the Dakota Tallgrass Prairie Wildlife Management Area 145, the Deuel County Waterfowl Production Area, the Singsaas State Conservation Area and the Fox Lake State Recreation Area. Depending on topography, vegetative foliage, and atmospheric conditions, turbines could be visible from any of these public lands.

The Tatanka Ridge Wind Farm is adjacent to the Project Area to the southwest. The Tatanka Ridge Wind Farm consists of 56 turbines and became operational in 2021. Additionally, the Deuel Harvest Wind Farm is located approximately 6 miles north of the Project Area. The Deuel Harvest Wind Farm consists of 109 turbines and became operational in 2021.

11.4.2 Visual Impacts/Mitigation

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

Construction, operation, and decommissioning of the Project will introduce visual contrasts in the Project Area that will cause a variety of visual impacts. The types of visual contrasts of concern include the potential visibility of turbines, transmission structures and conductors, and associated facilities, such as access roads; marker lighting on wind turbines and transmission structures; security and other lighting; modifications to landforms and vegetation; vehicles associated with transport of workers and equipment for construction, O&M activities and facility decommissioning. A subset of potential visual impacts associated with turbines are blade

movement, blade glinting[9], and shadow flicker[10]. Shadow flicker is discussed further in Section 11.5.

The primary visual impacts associated with the Project will result from the introduction of numerous vertical lines of the turbines and transmission structures into the generally strongly horizontal landscape found in the Project Area. The visible structures will produce visual contrasts by virtue of their design attributes (form, color, and line). In addition, marker lighting could cause some visual impacts at night, though these impacts will be mitigated by the installation of an ADLS.

For nearby viewers, including the rural residences dispersed throughout the Project Area, the sizes and geometric lines of both the individual turbines themselves and the array of turbines could dominate views, and the large sweep of the moving rotors would tend to command visual attention. Structural details, such as surface textures, could become apparent, and the O&M Facility, Collector Substation, Gen-Tie Line, and other structures will be visible as well.

For some, the presence of the Project within the viewsheds of WPAs, WMAs, recreational areas, and conservation areas may diminish the natural quality of those areas and the experience of those using those areas, potentially perceived as an adverse impact. However, the Project's operation will not generate a substantial increase in traffic or a noticeable increase in day-to-day human activity. Therefore, the Project Area will still retain its rural ambiance and remote nature characteristic of the vicinity. Furthermore, the proposed land use will not involve any ongoing industrial use of non-renewable resources, nor will it release emissions into the environment.

The magnitude of the visual impacts associated with the Project will depend on certain factors, including:

- Distance of the 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, South Deuel Wind has incorporated setback requirements and commitments into the design of the Project. As identified in **Table 5.2**, turbines will be set back at least 1,500 feet from existing participating residences, businesses, and public buildings, and at least 4 times the turbine height from non-participating residences and businesses per Ordinance requirements. Turbines will also be set back at least 1.1 times the turbine height from the ROW of public roads and from property lines. The towers will be painted a non-glare white, off-white, or gray to comply with FAA regulations and reduce potential glare and minimize visual impact. The Gen-Tie Line transmission structures have been sited to minimize potential visual impacts of the Gen-Tie Line within the Project Area. Based on the

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

Project's property rights, the Gen-Tie Line route is the most direct route and feasible path between the Collector Substation and Interconnection Switchyard and has been sited to minimize length, number of structures, and impacts. The conductor used for the Gen-Tie Line will be composed of non-reflective material, making the conductor less visible to viewers in the area.

As discussed in Section 18, the Project will be decommissioned after the end of the operational life of the Project. After decommissioning for the Project is complete, no visual impacts will remain except for aboveground Project Facilities that remain in use or can be repurposed.

11.5 Shadow Flicker

A Shadow Flicker Analysis for the Project is provided in **Appendix N**.

11.5.1 Shadow Flicker Overview

Shadow flicker occurs when rotating turbine blades pass in front of the sun to create recurring shadows on an object. Such shadows occur only under very specific conditions, depending upon sun position, wind speed and direction, time of day, and other similar factors. The Gen-Tie Line does not have any moving parts that would generate shadow flicker.

The intensity of shadow flicker varies significantly with distance, and as separation between a turbine and receptor increases, shadow flicker intensity correspondingly diminishes. Shadow flicker intensity for distances greater than 10 rotor diameters is generally low and considered imperceptible.

Shadow flicker impacts are not currently regulated in applicable state or federal law. Deuel County has adopted a zoning ordinance that limits shadow flicker levels of wind energy systems. Specifically, Section 1215.03(13)(b) of the Ordinance sets the "Limit for allowable shadow flicker at existing residences to no more than 30 hours annually."

11.5.2 Shadow Flicker Impacts/Mitigation

Shadow flicker was modeled for the Project using WindPRO, an industry-leading software package for the design and planning of wind energy facilities. This package models the sun's path with respect to every turbine location during every minute over a complete year. The model considered the attributes and positions of the turbines in relation to receptors, and each receptor within 1.25 miles of a proposed turbine location was modeled. This approach overestimates the amount of time when shadow flicker could occur for each receptor. Any shadow flicker caused by each turbine is then aggregated for each receptor for the entire year. All proposed turbine locations were evaluated.

The Shadow Flicker Analysis was prepared using a conservative methodology intended to overpredict anticipated Project impacts. Using the inputs and parameters defined in Section 3.0 of the Shadow Flicker Analysis (**Appendix N**), the WindPRO model was used to calculate shadow flicker for the receptors within 1.25 miles of all proposed turbine locations. The model estimated relevant climatological data such as sunshine hours and wind conservatively using regional meteorological data. Anticipated shadow flicker hours for each receptor were calculated without accounting for nearby structures, trees, or other vegetation that could block or reduce the shadow flicker experienced. Finally, although all proposed turbine locations for each turbine

model were analyzed, only up to 68 turbines total will ultimately be installed for the Project, depending on the nameplate capacity(s) of the turbine model(s) procured. Collectively, due to the assumptions modeled in the Shadow Flicker Analysis, the predicted shadow flicker impacts are higher than can reasonably be anticipated during operations.

Detailed tables are included within the Shadow Flicker Analysis that present estimated hours per year of shadow flicker by receptor for the three turbine models under consideration. No receptor will experience more than 30 hours of shadow flicker per year from the Project[11].

11.6 Electromagnetic Interference

11.6.1 Microwave Links

Comsearch conducted a Microwave Study (**Appendix O**) for South Deuel Wind evaluating the potential effects upon Federal Communication Commission ("FCC") licensed microwave paths due to construction and operation of the Project. The analysis consisted of a Fresnel x/y/z axis study. Fresnel and Consultation Zones were calculated for the identified microwave path using Comsearch proprietary microwave data, which includes all non-government licensed, proposed, and applied paths from 0.9-23 GHz that are registered with the FCC. The Fresnel Zone shows the narrow area of signal swath calculated for the identified microwave path in the Project Area. The Consultation Zone represents the area directly in front of each microwave antenna.

One unique point-to-point microwave path from the FCC database was identified within the Project Area and the Fresnel and Consultation Zones were calculated, which can be found in Figure 3 of the Microwave Study in **Appendix O**. The Project Layout was designed to avoid impacts to all existing microwave paths.

11.6.2 AM and FM Radio

Comsearch completed an amplitude modulation ("AM") and frequency modulation ("FM") Radio Report (**Appendix P**) for South Deuel Wind evaluating the potential effects upon FCC-licensed radio frequency facilities due to construction and operation of the Project. Two FM stations are located within approximately 18.75 miles (30 km) of the Project Area. These records represent one licensed station operating out of Clear Lake, South Dakota, and the other is a translator station operating with limited range. These stations are to the south and west of the Project Area, respectively.

The exclusion distance for AM broadcast stations varies by antenna type and broadcast frequency for directional antennas; it would be the lesser of 10 wavelengths or 1.88 miles (3 km) for non-directional antennas. A search radius of 18.75 miles (30 km) found no AM station records; therefore, no impacts on AM stations from Project activities should occur. According to the AM and FM Radio Report, FM stations are generally not susceptible to interference caused by wind turbines, especially at the distances recorded for those near the Project Area. The closest

[11] Prior to consideration of vegetative blocking or applied mitigation, the GE and SG turbine models indicated three participating receptors may receive over 30 hours of shadow flicker annually and the Vestas turbine model indicated the same at two participating receptors, The final turbine locations and turbine model(s) selected for construction will be modeled at these residences to confirm less than 30 hours of expected shadow flicker annually.

operational FM station is 2.1 miles (3.31 km) from the Project Area and should have adequate separation to avoid radiation pattern distortion.

11.6.3 Communication Towers

Comsearch conducted a Communication Tower Study (**Appendix Q**) for South Deuel Wind evaluating the potential effects upon licensed communication facilities due to the construction and operation of the Project. Two tower structures and fourteen communication antennas were identified within or in the vicinity of the Project Area using the FCC Antenna Structure Registration, Universal Licensing System, national and regional tower owner databases, and the local planning and zoning boards. These structures are used for land mobile, cellular, and microwave services in the area. The turbines are sited so that the rotors are outside of any communication beam paths to avoid disturbances to communication systems. Reasonable distance between land mobile and cellular communication antennas and turbines is based on FCC interference emissions from electrical devices according to their respective frequency bands.

The Communication Tower Study suggests turbines be set back from communication towers at a distance equivalent to the maximum height of the turbine to avoid impacts in the unlikely event of a turbine tower failure. The Project meets and exceeds this standard, with the closest communication antenna being approximately half a mile away from a proposed turbine location. If, after construction, South Deuel Wind receives information relative to communication systems interference potentially caused by operation of the Project in areas where reception is presently good, South Deuel Wind will resolve such problems on a case-by-case basis.

11.6.4 Department of Defense Radar

Westslope Consulting conducted a Radar and Navigational Aid Screening Study (**Appendix R**) for South Deuel Wind evaluating the potential effects upon Department of Defense ("DoD") radar due to the construction and operation of the Project. The DoD "pre-screening tool ("PST")" was used to evaluate the potential impacts to air defense long-range radar. After filing all possible turbine locations with the FAA in April 2023, the DoD is conducting a radar impact study, and South Deuel Wind will work with the DoD to mitigate any concerns. As discussed in greater detail in Section 15.4.2.2, the Project will obtain Determinations of No Hazard from the FAA and any required permits, or approvals from the South Dakota Aeronautics Commission prior to construction.

11.6.5 Military Airspace

A preliminary review of the Project Area utilizing the DoD's pre-screening tool returned potential impacts to military airspace. According to the Radar and Navigational Aid Study conducted by Westslope Consulting (**Appendix R**), the Project Area may be in the line of sight of the Tyler Common Air Route Surveillance Radar. This radar is used for air defense and homeland security. The FAA's aeronautical study and the DoD Siting Clearinghouse processes will provide an official decision as to whether impacts are acceptable to operations. If they are not, South Deuel Wind will work with the DoD and/or Department of Homeland Security to mitigate any concerns prior to construction. Based on conversations with the DoD, mitigation measures are not anticipated to impact proposed turbine locations.

Additionally, Capitol Airspace Group conducted an Obstruction Evaluation and Airspace Analysis for South Deuel Wind (**Appendix S**) to identify obstacle clearance surfaces established by the FAA that could limit the placement of wind turbines. According to this analysis, no military airspace nor training routes overlie the Project Area. As a result, these segments of airspace should not result in military objections.

11.6.6 NEXRAD

Westslope Consulting also used the DoD pre-screening tool to evaluate the potential impact of obstructions to the Next-Generation Radar ("NEXRAD") Weather Surveillance Doppler Radar Stations due to construction and operation of the Project (**Appendix R**). The PST NEXRAD analysis evaluates potential impacts to DoD, FAA, and National Oceanic and Atmospheric Administration ("NOAA") Weather Surveillance Radar model-88 Doppler ("WSR-88D") sites. The Project is in a "No Impact Zone," indicating that it is not expected to impact NEXRAD weather radar nor WSR-88D operations. Further due diligence of NEXRAD impacts is underway and South Deuel Wind is working with the NOAA to mitigate any concerns.

11.6.7 National Telecommunication Information Administration

Operation of radio frequencies for Federal Government use is managed by the National Telecommunications and Information Administration ("NTIA"), which is part of the U.S. Department of Commerce. The NTIA has developed a review process, wherein the Interdepartmental Radio Advisory Committee, consisting of representatives from various government agencies, reviews new proposals for wind energy facilities for any potential impact to government frequencies. South Deuel Wind will submit Project plans to the NTIA for evaluation after turbine technology selection. The NTIA will generate a letter with the Project details and send it to all affiliated government agencies. Each agency has a 45-day window to respond with possible concerns. South Deuel Wind will resolve any concerns directly with the respective agencies prior to construction.

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

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

The Project will be constructed on agricultural land in Deuel County. Land use for unincorporated areas in Deuel County is regulated by the Deuel County Zoning Ordinance. Section 1215 of the Ordinance governs wind energy system requirements. Pursuant to the Ordinance, wind energy systems in Deuel County must obtain a CUP. Building permits for each individual turbine prior to construction are also required. In 2023, South Deuel Wind received a

CUP from Deuel County for the Project. The CUP, associated findings, and the Wind Energy System section of the Ordinance are provided in **Appendix B.**

The Ordinance includes specific requirements concerning setbacks, lighting, decommissioning, and mitigation measures. **Table 5.2** identifies the siting requirements established by Deuel County. South Deuel Wind has designed the Project to meet the requirements contained in the Ordinance and will comply with all applicable terms and conditions of the permits from Deuel County. South Deuel Wind is currently in negotiations with Deuel County on a Road Use Agreement governing the use, improvement, repair, and restoration of roads within the county, as needed, and will obtain any road crossing, approach, and utility permits required for the Project.

13. Water Quality (ARSD 20:10:22:20)

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

Groundwater and surface water resources are discussed in Section 8. As discussed in Section 8.2.2, increased sedimentation, reduction of available flood storage, and impacts to drainage patterns due to stormwater runoff from the Project during construction and operation will be minimized by BMP.

Construction of the Project will require coverage under the SDDENR General Permit for Storm Water Discharges Associated with Construction Activities. To maintain compliance with provisions of this General Permit, South Deuel Wind will prepare a SWPPP to identify potential sources of stormwater pollution from the Project site and specify BMPs to control erosion and sedimentation and minimize negative impacts caused by stormwater discharges from the Project. The BMPs may include silt fence, wattles, erosion control blankets, temporary stormwater sedimentation ponds, revegetation, and/or other features and methods designed to control stormwater runoff and mitigate erosion and sedimentation. 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.

Section 1215.03.vi of the Ordinance requires wind energy systems to develop a Soil Erosion and Sediment Control Plan prior to construction and submit the plan to the Deuel County Zoning Office. The Ordinance outlines several components required in the plan including, but not limited to, plans for grading, construction and drainage of roads and turbine pads, a comprehensive revegetation plan, and surface disturbance minimization measures. South Deuel Wind will submit a copy of the SWPPP to the Deuel County Zoning Office prior to construction to fulfill this requirement.

14. Air Quality (ARSD 20:10:22:21)

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

14.1 Existing Air Quality

South Dakota is in attainment for all National Ambient Air Quality Standards ("NAAQS") criteria pollutants (EPA, 2024). The nearest ambient air quality monitoring sites to the Project Area are in Watertown and Brookings, which are located approximately 23 miles northwest and 20 miles south of the Project, respectively. The primary emission sources that exist within the Project Area include agriculture-related equipment and vehicles traveling along State Highway 15.

14.2 Air Quality Impacts

Temporary construction activities may lead to fugitive dust emissions and short-term emissions from diesel trucks and construction equipment. Temporary impacts may result if a concrete batch plant is required. However, any air quality effects resulting from construction will be short-term and limited to the duration of construction activities, without exceeding NAAQS for particulate matter or significantly increasing greenhouse gas emissions.

While operational, the wind turbines and Gen-Tie Line are expected to have no direct air emissions because no fossil fuels will be combusted. Wind power is recognized as a low-carbon energy source, as electricity generation from wind turbines produces zero carbon emissions. Consequently, the development of clean wind energy avoids significant carbon dioxide ("CO_2") pollution, with estimates suggesting that wind energy generation in 2022 avoided approximately 336 million metric tons of CO_2 emissions, equivalent to the emissions from approximately 73 million cars (ACP, 2023). Wind power also significantly reduces the amount of sulfur dioxide ("SO_2") and nitrogen oxides ("NO_x") in the air, pollutants associated with smog formation and asthma exacerbation.

Operation of the Gen-Tie Line is expected to have negligible impacts on air quality. Studies examining ozone production under transmission lines have generally been unable to detect any significant increases attributable to a transmission facility (Sebo et al., 1976; Valuntaite et al., 2009). Existing calculations concerning ozone production and concentration typically assume conditions of high humidity or rain, with no reduction in the amount of ozone due to oxidation or air movement. These calculations therefore overestimate the amount of ozone produced and concentrated at ground level.

During O&M activities, negligible amounts of dust, vehicle exhaust emissions, and combustion-related emissions from diesel emergency generators may occur, without causing exceedances of air quality standards or negative impacts on climate change. The operation of the Project could produce minute amounts of ozone and nitrogen oxides emissions as a result of atmospheric interactions with the energized conductors. These minor emissions during operation will have a negligible impact on ambient air quality. The use of sulfur hexafluoride-filled circuit breakers

will be used in the Collector Substation; leaks are rare, and air quality impacts from maintenance and inspection activities are anticipated to be negligible.

14.3 Mitigation Measures for Air Quality

A general air quality permit from SDDENR may be required if the Project elects to utilize a concrete batch plant. Any such permit would be obtained by the construction contractor or concrete batch plant operator.

BMPs will be implemented during construction to suppress fugitive dust emissions, and regular inspections and preventative maintenance will be conducted on equipment during operations to minimize leaks. BMPs mitigation strategies include:

- Using surface access roads, on-site roads, and parking lots surfaced with aggregates or designed to maintain compacted soil conditions to mitigate dust generation;
- Strategically staging construction activities to limit the area of disturbed soils exposed at any given time to the extent practicable; and
- Watering unpaved roads, disturbed areas (e.g. scraping, excavation, backfilling, grading and compacting), and loose materials generated during Project activities as needed to minimize fugitive dust generation.

15. Community Impact (ARSD 20:10:22:23)

ARSD 20:10:22:23. Community impact. *The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility will have on the anticipated affected area including the following:*
(1) A forecast of the impact on commercial and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities or services;
(2) A forecast of the immediate and long-range impact of property and other taxes of the affected taxing jurisdictions;
(3) A forecast of the impact on agricultural production and uses;
(4) A forecast of the impact on population, income, occupational distribution, and integration and cohesion of communities;
(5) A forecast of the impact on transportation facilities;
(6) A forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance. The information shall include the applicant's plans to coordinate with the local and state office of disaster services in the event of accidental release of contaminants from the proposed facility; and
(7) An indication of means of ameliorating negative social impact of the facility development.

15.1 Socioeconomic and Community Resources

15.1.1 Existing Socioeconomic and Community Resources

The Project Area is located in northeastern South Dakota in Deuel County. In 2020, Deuel County had an estimated population of 4,295 (U.S. Census Bureau, 2020). Clear Lake, with an estimated 2020 population of 1,218, is the largest city in Deuel County (U.S. Census Bureau, 2020). Clear Lake is located approximately 3 miles north of the Project Area. The populations of the communities within 50 miles of the Project Area are provided in **Table 15.1.1**.

Table 15.1.1 Populations of Communities Within 50 Miles of Project Area

Community	County	2020 Population Estimate	Distance and Direction from Project Area
Brandt	Deuel	114	Within Project Area
Clear Lake	Deuel	1,218	3 miles north
Gary	Deuel	240	7 miles north
Altamont	Deuel	32	8 miles north
Canby	Yellow Medicine	1,695	12 miles east
Goodwin	Deuel	147	13 miles northwest
Revillo	Grant	99	20 miles north
Watertown	Codington	22,655	22 miles northwest
Milbank	Grant	3,544	35 miles north
Madison	Lake	6,191	49 miles southwest

Source: U.S. Census Bureau (2020)

The median household income in 2022 in Deuel County was $76,997. In 2022, 5.8 percent of the population was below the poverty level. By comparison, the median household income for the state was lower ($69,728), and the poverty level was higher (12.5 percent) (U.S. Census Bureau, 2022).

In Deuel County, the top industries in terms of employment in 2022 were: (1) manufacturing (24.2 percent of employment); (2) educational services, health care, and social services (16.5 percent of employment); and (3) agriculture, forestry, fishing and hunting, and mining (13.6 percent) (U.S. Census Bureau, 2022). The unemployment rate in Deuel County in December 2023 was 3.5 percent, and the South Dakota unemployment for that same month was 2 percent (South Dakota Department of Labor and Regulation [“SDDLR”], 2023).

15.1.2 Socioeconomic and Community Impacts

15.1.2.1 Economic Impacts

The Project is anticipated to provide positive short-term and long-term impacts to the local economy. Wind energy facilities have numerous benefits for local communities including direct payments to participating landowners, increased local government revenue from property taxes, and job opportunities during both the short-term construction phase and the long-term operational phase. South Deuel Wind is expected to create approximately 109 temporary construction jobs for Deuel County and 243 temporary construction jobs for South Dakota. At

peak construction, approximately 200 employees are anticipated to be on-site. Employees hired during construction will include skilled labor, such as foremen, carpenters, iron workers, electricians, millwrights, and heavy equipment operators, as well as unskilled laborers. During operations, South Deuel Wind is expected to employ approximately eight full-time employees. Employees hired during operation will include turbine technicians, facility manager(s), and administrative personnel as necessary.

In addition to the employees directly involved in the construction and maintenance of the Project, numerous other jobs are created through indirect supply chain purchases, services required, and the higher spending that is induced by employees and landowners. Local businesses, such as restaurants, grocery stores, hotels, and gas stations, will see increased business from construction-related workers. Local industrial businesses, including aggregate and cement suppliers, welding and industrial suppliers, hardware stores, automotive and heavy equipment repair, electrical contractors, and maintenance providers, will also likely benefit from construction of the Project.

Long-term beneficial impacts to the state and local tax base as a result of the operation of the Project will contribute to improving the local economy. In addition to the creation of jobs and personal income, the Project will pay capacity and production taxes which will benefit the state, Deuel County, school districts and the communities in the Project Area with wind turbines. Over the 30-year operational life of the Project, South Deuel Wind is expected to generate[12]:

- Approximately $78 million for Deuel County landowners, an average of approximately $2.6 million each year;
- Approximately $9.1 million in total county property taxes for Deuel County, an average of over $303 thousand each year;
- Approximately $11.9 million in total state property taxes for the state of South Dakota, an average of over $396 thousand each year;
- Approximately $13 million to the local school districts in tax revenue; and
- Approximately $634 thousand annually for employees of South Deuel Wind that are anticipated to reside locally.

The above direct payment information does not include any multiplying factor of additional income earned being kept in Deuel County or the local area, which is expected to multiply the total economic impact of the Project.

15.1.2.2 Population and Housing

South Deuel Wind anticipates that trained local labor will not be sufficient to fill the total number of jobs available. The largest city that would provide workers local to the Project would be Sioux Falls, South Dakota, followed by Watertown, South Dakota. Workers within an 85-mile radius will likely commute and therefore not require temporary housing in the Project Area. Workers outside an 85-mile radius will likely require temporary housing in or near the Project Area but South Deuel Wind expects existing community facilities and services to be generally

[12] To estimate the generation-based property tax portion of payments that comprise the above property tax payments, South Deuel Wind utilized a net capacity factor of 48%.

adequate to support the workforce during construction. The Project does not anticipate long-term impacts on overall population and occupation distribution in Deuel County.

15.1.2.3 Property Value Impacts

To evaluate the Project's potential impact on property values, South Deuel Wind engaged MaRous & Company to prepare a detailed Market Impact Analysis provided in **Appendix T**. Michael MaRous, a Member of the Appraisal Institute appraiser and owner and president of MaRous & Company, concluded that there is no market evidence indicating the Project will have a negative impact on either rural residential or agricultural property values in the surrounding area of the Project in Deuel County. Further, market data from South Dakota supports the conclusion that the Project will not have a negative impact on rural residential or agricultural property values in the surrounding area. For agricultural properties that host turbines, the additional income from the wind lease may increase the value and marketability of those properties. These conclusions were based on the following:

- The Project will meet or exceed the required development and operating standards;
- Controls are in place for on-going compliance;
- There are significant financial benefits to the local economy and to the local taxing bodies from the development of the wind farm;
- The wind farm would create well-paid jobs in the area which would benefit overall market demand;
- An analysis of recent residential sales proximate to existing wind farms, in South Dakota and other Midwestern states, did not support any finding that proximity to a wind turbine had a negative impact on property values;
- An analysis of agricultural land values in South Dakota did not support any finding that the agricultural land values are negatively impacted by the proximity to wind turbines;
- Reports from Iowa, Minnesota, Illinois, Indiana, Michigan, South Dakota, Ohio, and Kansas indicate that wind turbine leases add value to agricultural land; and
- A survey of County Assessors in 8 South Dakota counties, 41 Iowa counties, 11 Minnesota counties, 20 Illinois counties, 5 Indiana counties, 7 Michigan counties, 3 Ohio counties, 6 New York counties and City/Town Assessors in 7 New York cities/towns, 21 Kansas counties, and 5 West Virginia counties in which wind farms with more than 25 turbines are located determined that there was no market evidence to support a negative impact upon residential property values as a result of the development of and the proximity to a wind farm and that there were no reductions in assessed valuation.

Similarly, the SDPUC has previously concluded that there is "no record evidence that property values will be adversely affected." *In the Matter of the Application of Dakota Range I, LLC and Dakota Range II, LLC for a Permit of a Wind Energy Facility in Grant County and Codington County, South Dakota for the Dakota Range Wind Project,* Docket No. EL18-003, Final Decision and Order Granting Permit to Construct Wind Energy Facility, Notice of Entry Para. 55 (July 23, 2018). The SDPUC found similarly in the Crocker Wind Farm docket: "There was no credible showing that there will be quantifiable or qualitative effect on property value." *In the Matter of the Application by Crocker Wind Farm, LLC for a Permit of a Wind Energy Facility and a 345 kV Transmission Line in Clark County, South Dakota, for Crocker Wind Farm,*

Docket No. EL17-055, Final Decision and Order Granting Permit to Construct Facilities and Notice of Entry, ¶ 60 (June 12, 2018).

The impact of transmission lines on property values has also been reviewed in the literature. In 2010, Jackson and Pitts prepared a literature review of empirical studies conducted between 1964 and 2009. Based on the studies reviewed, while having some inconsistencies in their detailed results, there were generally small (two to nine percent reduction in property value), or no effect on sales price due to the presence of electric transmission lines. Where an effect was detected, this effect generally dissipated with time and distance. While this study indicates that a small reduction in property value is possible, significant impacts to property values are not anticipated.

15.1.2.4 Mitigation Measures for Socioeconomic and Community Impacts

As noted above, the Project will positively impact the local community. As such, no mitigation measures are proposed.

15.2 Commercial, Industrial, and Agricultural Sectors

15.2.1 Existing Commercial, Industrial, Agricultural Sectors

The Project Area is predominantly agricultural, consisting of a mix of cropland and pastureland. No commercial or industrial land uses are located within the Project Area. In 2022, Deuel County's 498 farms (totaling 253,106 acres of land) produced $232.4 million in agricultural products (USDA, 2024). Forty-seven percent was from livestock sales and 53 percent was from crop sales. Cattle and calves were the top livestock inventory item in the county, and corn was the top crop in terms of acreage. Deuel County ranked 22nd out of the 66 South Dakota counties in total value of agricultural products sold (USDA, 2024).

15.2.1.1 Impacts to Commercial, Industrial and Agricultural Sectors

Approximately 1,058 acres of temporary ground disturbance impact is expected during construction of the Project. Following completion of construction, all temporary construction workspaces will be cleaned up and restored to pre-construction conditions pursuant to the lease and easement agreements. Damage to crops that occur on cultivated lands during construction will be compensated for by South Deuel Wind. Approximately 51 acres will be taken out of agricultural use for the operational life of the Project to host above-ground Project Facilities. Crops can be grown, and livestock can graze, up to the turbines, transmission structures, and other above-ground Project Facilities.

15.2.2 Mitigation Measures for Commercial, Industrial and Agricultural Sectors

The mitigation measures for impacts to agricultural lands are described in Sections 4.4.10 and 4.5.3.

15.3 Community Facilities and Services

15.3.1 Existing Community Facilities and Services

Table 15.1.1 identifies communities within the vicinity of the Project Area which will have facilities and services such as hospitals, police, fire and ambulance services, schools, churches

and parks, and recreational facilities. Electrical service in the Project Area is provided by H-D Electric Cooperative. The Brookings-Deuel rural water system supplies rural water to the Project Area and maintains a network of distribution lines within the Project Area.

15.3.2 Impacts to Community Facilities and Services

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

It is expected that the Project will have no significant impact on the security and safety of the local communities and the surrounding area during construction and operation. Additional risk for workers or public injury may exist during the construction phase, as it will for any large construction project. In response, work plans and specifications will be prepared to address worker and community safety during construction. The Project's construction contractor will identify and secure all active construction areas to prevent public access to potentially hazardous areas.

15.3.2.1 Mitigation Measures for Community Facilities and Services

During construction, the Project's construction contractor will work with local emergency response agencies to develop procedures for response to emergencies, natural hazards, hazardous materials incidents, manmade problems, and potential incidents concerning construction. The construction contractor will provide site maps, haul routes, schedules, contact numbers, training, and other requested Project information to local emergency response agencies. During operation, South Deuel Wind will communicate regularly with local first response agencies and coordinate training meetings in accordance with the Project's ERP. Should any aspect of the Project construction or operations present unfamiliar situations for first responders, South Deuel Wind will arrange for adequate professional training to address those concerns. South Deuel Wind will register each turbine and the O&M Facility with the rural identification/addressing (fire number) system and 911 systems.

15.4 Transportation

15.4.1 Existing Transportation

15.4.1.1 Ground Transportation

The existing roadway infrastructure within and near the Project Area generally follows section lines and is characterized by federal, state, county, municipal, and township roads. The primary access to the Project Area is via State Highway 15 which extends through the western portion of the Project Area. The roads within the Project Area are summarized in **Table 15.4.1.1**.

Table 15.4.1.1 Project Area Roads			
Road	**Surface Type**	**Width**	**Lanes**
State Highway 15	Paved asphalt	24 feet	2
Secondary County roads	Gravel or crushed rock/Bituminous	18 to 22 feet	1 to 2
Secondary Township roads	Gravel or crushed rock	16 to 20 feet	1 to 2

Source: South Dakota Department of Transportation ("SDDOT") (2024)

Traffic counts in the Project Area were available for U.S. and State highways in 2023, and data were available for select county roads in the Project Area ranging from 2014 to 2023. In 2023, Average Daily Traffic ("ADT") volume was between 1,446 to 1,475 trips along State Highway 15 in the Project Area. The ADT number of vehicles counted on county roads of the Project Area were much lower, however, ranging from a low of 50 vehicles on 185th Street to a high of 260 vehicles on 188th Street (SDDOT, 2024).

15.4.1.2 Aviation

There are no public airports located within the Project Area. The closest airports to the Project Area are the Lake Cochrane Seaplane Base, located 2.3 miles east of the Project Area, and the Clear Lake Municipal Airport, located 4.2 miles north of the Project Area. South Deuel Wind has not identified any private airstrips within the Project Area. Air traffic may be present near the Project Area for crop dusting of agricultural fields. Crop dusting is typically carried out during the day by highly maneuverable airplanes or helicopters. The installation of wind turbines introduces the risk of collision with crop-dusting aircraft. The turbines will be visible from a distance and illuminated according to FAA guidelines. Seventy-one of the 73 proposed turbine locations in the Project Layout have been submitted to the FAA to obtain Determinations of No Hazard. South Deuel Wind anticipates submitting the remaining two turbine locations to the FAA to obtain Determinations of No Hazard in July 2024.

15.4.2 Impacts to Transportation

15.4.2.1 Ground Transportation

During construction, temporary impacts to public roads within the Project Area are anticipated. Construction vehicles, including light, medium, and heavy-duty construction vehicles, as well as private vehicles used by construction personnel, will travel to and from the work sites, thereby increasing the daily traffic on the roads. Some activities may require extended construction hours, and nighttime construction may be necessary to maintain the construction schedule. Most heavy equipment (cranes and earthmoving equipment) will remain at the site for the duration of construction activities. Some roads may require temporary expansion along specific routes as necessary to facilitate the movement of equipment. Shipment of construction materials, such as gravel, concrete, and water are not expected to substantially affect local primary and secondary road networks. Construction activities will increase the amount of traffic using local roadways, but such use is not anticipated to result in significant adverse traffic impacts.

The Project will not result in permanent impacts to the area's ground transportation resources. Improvements to most gravel roads and temporary impacts to local roads will occur during construction of the Project. South Deuel Wind is currently in negotiations with Deuel County on

a Road Use Agreement governing the use, improvement, repair, and restoration of roads within the county, and will obtain any road crossing, approach, and utility permits required for the Project.

After construction is complete, traffic impacts during operation of the Project will be minimal. Project personnel will drive through the area in pickup trucks on a regular basis to monitor and maintain the Project Facilities, as needed. Heavy equipment may occasionally return to the site if large components need to be repaired or exchanged. A slight, temporary, increase in traffic will occur for occasional repair of Project Facilities, but traffic flow will not be impacted as a result.

15.4.2.2 Aviation

Capitol Airspace Group conducted an Obstruction Evaluation and Airspace Analysis (**Appendix S**) for South Deuel Wind in 2021. The purpose of this analysis was to identify obstacle clearance surfaces established by the FAA that could limit the placement of wind turbines. South Deuel Wind's siting reflects the clearance restrictions identified in the Analysis. As often occurs during the development of a wind energy facility, South Deuel Wind has made adjustments to the Project area boundary since the analysis was procured. Although portions of the Project Area extend beyond the study area examined by Capitol Airspace Group in 2021, the information obtained was sufficient to be contemplated during the siting of the Project. As indicated by the Analysis, air traffic is not anticipated to be impacted by the Project.

Federal aviation regulations require structures that exceed 200 feet above ground level to be submitted to the FAA for aeronautical study, to determine whether the structures may be a hazard to air navigation or the efficient utilization of navigable airspace by aircraft. Vertical limits for wind turbines depend on specific location and respective airspace classifications. South Deuel Wind submitted wind turbine locations to the FAA in April 2023 for review and is currently awaiting a response. The Project will obtain a Determination of No Hazard from the FAA and any required permits or approvals from the South Dakota Aeronautics Commission for each turbine prior to construction.

After receiving FAA Determinations of No Hazard and finalizing turbine locations, South Deuel Wind will work with the FAA to determine a lighting plan for the Project. The plan will comply with all South Dakota requirements for ADLS outlined in Codified Law 49-41B-25.2 while meeting the requirements set forth in Chapter 14 of FAA Advisory Circular (AC) 70/7460-1L. Notification of construction will be provided to the FAA for each turbine location prior to construction (Form FAA 7460-2 Part 1), after reaching maximum turbine height (7460-2 Part 2), or both. South Deuel Wind will also complete any required notifications, permits, or approvals with the South Dakota Aeronautics Commission related to Project facilities.

The installation of wind turbines, MET towers, and ADLS towers will create additional obstacles for crop-dusting aircraft. While the Gen-Tie Line will also be an obstacle for crop-dusting aircraft, the minimal crop-dusting activities within the Project Area and familiar resemblance to existing transmission/distribution line structures usually situated along field edges and roadways are anticipated to result in minimal risk. Pilots operating in the vicinity of the Project are anticipated to become accustomed to the Gen-Tie Line's location and adjust their maneuvers accordingly.

15.4.3 Mitigation Measures for Transportation

15.4.3.1 Ground Transportation

As part of the Road Use Agreement currently in negotiation with Deuel County, prior to delivery of Project components, South Deuel Wind will coordinate with local road authorities to establish a traffic control plan to ensure the safe and efficient use of roads and to minimize and mitigate the overall impact of traffic. Trucks will not be allowed to stage or block public roads. If trucks cannot exit the roadway in a timely fashion, they will be directed to a designated staging area.

If roads require temporary expansion or improvements to facilitate the movement of Project equipment, local traffic will be directed safely through the work area or around on alternate routes, if needed. Some delays or detours may be necessary to enable the installation of road improvements, but the Project will have plans in place to enable the traffic to move safely. Delays and detours will be similar in nature to what can occur during peak farming operations or other road improvements. The construction site manager will be available on-site to address any concerns or challenges that occur during construction. Project personnel and contractors will be 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 cost estimate to repair roads to pre-construction conditions will be completed as part of final engineering and will depend on the plans for road upgrades as well as the equipment delivery plan. With respect to the Gen-Tie Line, pursuant to SDCL 49¬41B-38, South Deuel Wind will furnish an indemnity bond to secure the restoration and repair of roads after construction. South Deuel Wind expects this indemnity bond to be informed by the road use agreement negotiations with Deuel County and the affected townships.

15.4.3.2 Aviation

Wind turbines, MET towers, and ADLS towers will be visible from a distance and lighted according to FAA guidelines. MET towers and ADLS towers will be free-standing with no guy wires. South Deuel Wind will notify local airports about the Project and new towers in the area to reduce the risk to crop dusters. South Deuel Wind will also work with landowners to coordinate crop dusting activities to further reduce risk to crop dusters.

15.5 Cultural Resources

15.5.1 Existing Cultural Resources

To assess the cultural resources within the Project Area, South Deuel Wind defined a Component Footprint as the construction footprint and an additional buffer on some Project Facilities for minor siting adjustments. The Component Footprint included all turbine locations, associated access roads, the electrical collection system, Collector Substation, O&M Facility, and Gen-Tie Line ROW. Similarly, the Physical Area of Potential Effects (“APE”), while related, has its own distinct definition, aligning with the construction footprint but lacking any buffers. South Deuel

Wind has completed field surveys for 93 percent[13] of the areas that would be temporarily and/or permanently impacted by Project Facilities as proposed in the Project Layout. The information in this Application is based on the results of these surveys. South Deuel Wind will conduct additional field surveys prior to construction, as necessary, to ensure coverage of all areas that will be temporarily and/or permanently impacted by Project Facilities in the final Project layout. South Deuel first engaged Burns & McDonnell to complete a Cultural Resource Level I Records Review to identify both archaeological and historic resources previously recorded in the vicinity of the Project. Building upon the findings of the Records Review, South Deuel Wind engaged Burns & McDonnell to complete a Level III Intensive Archaeological Resources Survey for the Component Footprint (**Appendix U - Confidential**).

Concurrently, South Deuel Wind engaged Burns & McDonnell to conduct a Historic-Age Resource Survey within the Project APE, comprised of the Physical APE and a 1-mile buffer surrounding it (**Appendix V**). This survey focused on locating standing historic-era buildings, structures, objects, districts, etc. to assess the visual impacts of the Project on their integrity of setting.

All work was conducted to professional standards and guidelines in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-44742), the Secretary's Standard for Identification (48 FR 44720-44723), and the 2012 South Dakota Guidelines for Compliance with the National Register of Historic Preservation Act and South Dakota Codified Law 1-19A-11. The work also complies with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-44742) and the Secretary's Standards for Identification (48 FR 44720-44723), as well as the State Historic Preservation Office's South Dakota Guidelines for Complying with Federal and State Preservation Laws (South Dakota State Historical Society, 2023a) and South Dakota Architectural Survey Manual (South Dakota State Historical Society, 2023b).

15.5.1.1 Previously Recorded Archaeological Sites

The Cultural Resource Level I Records Review identified 16 previously recorded archaeological sites within the Study Area, which comprised of the Component Footprint and a 1-mile buffer (**Table 15.1.1.1**). None of the previously recorded archaeological sites identified are located within the Component Footprint.

[13] Approximately 75 acres that would be temporarily and/or permanently impacted by Project Facilities as proposed in the Project Layout have not yet been field surveyed. Requisite surveys for any impacted areas will be completed prior to construction.

Table 15.5.1.1 Previously Recorded Archaeological Sites Within the Study Area			
Site	**Site Type**	**Cultural Affiliation**	**NRHP Eligibility Status**
39DE0035	Native American artifact scatter	Prehistoric	Not eligible
39DE0040	Archaic artifact scatter	Archaic	Not eligible
39DE0041	Native American artifact scatter	Prehistoric	Unevaluated
39DE0047	Native American artifact scatter	Prehistoric	Not eligible
39DE0013	Late Archaic Occupation; Woodland occupation; Native American mound; Native American burial	Late Archaic, Woodland	Unevaluated
39DE0039	Native American artifact scatter	Prehistoric	Not eligible
39DE0063	Faunal/ Paleontological	Unknown	Unevaluated
39DE0084	Native American artifact scatter	Prehistoric	Unevaluated
39DE0122	Native American isolated find	Prehistoric	Not eligible
39DE0126	Farmstead/ Euroamerican artifact scatter	Euroamerican	Unevaluated
39DE0129	Euroamerican artifact scatter	Euroamerican	Not eligible
39DE0130	Euroamerican artifact scatter; farmstead	Euroamerican	Not eligible
39DE0146	Native American isolated find	Prehistoric	Not eligible
39DE0147	Native American isolated find	Prehistoric	Not eligible
39DE0148	Native American isolated find	Prehistoric	Not eligible
39DE0149	Native American isolated find	Prehistoric	Not eligible
39DE0035	Native American artifact scatter	Prehistoric	Not eligible
39DE0040	Archaic artifact scatter	Archaic	Not eligible

Source: South Dakota State Historical Society – Archaeological Research Center, October 2022

15.5.1.2 Historic-Age Non-Archaeological Resources

The Cultural Resource Level I Records Review identified two NRHP-listed architectural resources within the Project APE (**Table 15.5.1.2**). The records review also identified an additional 22 previously recorded historic-age architectural resources within the Project APE. Four of the properties were previously determined NRHP-eligible; 17 were previously determined not eligible for NRHP inclusion; and one had not been evaluated. None of the resources associated with these properties are located in the Physical APE. One of the resources identified, the L.L. Bartlett House (Site ID 2134), is a 1908 stone dwelling that is mis-mapped in the NRHP database as being within the Project APE near the intersection of 184th Street and 478th Avenue. The resource is correctly mapped in CRGRID in its actual location: Meade County in west-central South Dakota, approximately 289 miles west of the Project APE. Bridge No. 20-153-210 (Site ID 28271) is a Pratt Pony Truss bridge originally constructed in 1908 that is located within the Project APE, but outside of the Physical APE. All previously recorded resources were revisited during field survey efforts.

Table 15.5.1.2 Previously Recorded Architectural Resources Within the Project APE		
Site ID	**Resource Name**	**NRHP Eligibility**
2134	L.L. Bartlett House	Listed (mis-mapped in NRHP database)
28271	Bridge 20-153-210	Listed
474	Willow Row School District No. 7	Not Eligible (relocated)
475	Concrete Box Culvert	Not Eligible
638	Granary	Not Eligible
665	Singsaas Stone	Eligible
666	Andrew Singsaas Homestead	Not Eligible
667	Wood Lake Evangelical Lutheran Church	Eligible
668	Farmstead	Undetermined (non-extant)
28292	Bridge 20-065-196	Not Eligible (relocated)
28293	Bridge 20-065-189	Not Eligible (non-extant)
28294	Bridge 20-175-240	Eligible (non-extant)
48218	Bridge 20-105-180	Not Eligible
48219	Bridge 20-107-190	Not Eligible
48220	Bridge 20-111-220	Not Eligible
48223	Bridge 20-156-220	Not Eligible (non-extant)
48226	Bridge 20-170-235	Not Eligible (non-extant)
48227	Bridge 20-170-249	Not Eligible
55844	Farmstead	Eligible
55845	Farmstead	Unevaluated
68883	Culvert No. 26854	Not Eligible
68884	Culvert No. 26850	Not Eligible
68885	Culvert No. 26842	Not Eligible
68888	Odonoghue Farm Garage	Not Eligible

Source: CRGRID 2023

15.5.2 Level III Archaeological Survey

The Level III Intensive Archaeological Resources Survey was completed for the Component Footprint in November and December 2022; June, July, and August 2023 (**Appendix U - Confidential**). The survey identified a total of 15 newly recorded archaeological sites, two isolated find sites, and an update to previously recorded site 39DE2016. All newly identified sites were fully delineated, beyond the boundaries of the Study Area if necessary, and were investigated for integrity and significance. Burns & McDonnell's recommendations for archaeological sites within the Study Area are summarized in **Table 15.5.2**.

Table 15.5.2 Archaeological Site Recommendations within Study Area					
Site No.	**Site Type**	**Identified Component**	**Site Integrity**	**NRHP Recommendation**	**Recommendation**
39DE0165	Farmstead	Euroamerican, early to mid-twentieth century	Poor	Not eligible	No further work is recommended
39DE0166	Farmstead	Euroamerican, early to mid-twentieth century	Fair	Unevaluated	Project avoidance is recommended
39DE0167	Farmstead	Euroamerican	Fair	Unevaluated	Project avoidance is recommended
39DE0168	Farmstead	Euroamerican	Poor	Not eligible	No further work is recommended
39DE0169	Farmstead	Euroamerican	Poor	Not eligible	No further work is recommended
39DE0170	Isolated find, biface fragment	Unknown prehistoric	Poor	Not eligible	No further work is recommended
39DE0171	Farmstead	Euroamerican	Fair	Unevaluated	Project avoidance is recommended
39DE0172	Farmstead	Euroamerican	Poor	Not eligible	No further work is recommended
39DE0173	Isolated find, biface fragment and two flakes/debitage	Unknown prehistoric	Poor	Not eligible	No further work is recommended
39DE0174	Historic-era artifact scatter	Euroamerican	Poor	Not eligible	No further work is recommended
39DE0175	Native American artifact scatter	Unknown prehistoric	Poor	Not eligible	No further work is recommended
39DE0176	Stone cairns	Unknown prehistoric	Fair	Eligible	Project avoidance is recommended

Table 15.5.2 Archaeological Site Recommendations within Study Area					
Site No.	**Site Type**	**Identified Component**	**Site Integrity**	**NRHP Recommendation**	**Recommendation**
39DE0177	Stone cairn	Unknown prehistoric	Fair	Eligible	Project avoidance is recommended
39DE0178	Stone cairns	Unknown prehistoric	Fair	Eligible	Project avoidance is recommended
39DE0179	Farmstead	Euroamerican	Poor	Not eligible	No further work is recommended
39DE0180	Historic-era outbuilding foundation	Euroamerican	Poor	Not eligible	No further work is recommended
39DE2016	Rail line/bed	1884 to 1956, Euroamerican	Poor	Considered non-contributing segment to overall eligible railroad site	No further work is recommended
39DE0181	Farmstead	Euroamerican	Poor	Not eligible	No further work is recommended

15.5.3 Historic Architectural Resources Reconnaissance Survey

The Historic Architectural Resources Reconnaissance Survey was conducted in phases in August 2018 with revisits in January and June 2023. During the field survey effort, surveyors sought to document all buildings, structures, objects, districts, etc. constructed in or prior to 1978 (45 years of age or older) within the Project APE. Each resource was evaluated for both state and national designation.

Preliminary NRHP eligibility assessments were based on the Secretary of the Interior's standards for identification and evaluation of historic resources. The method of survey naturally favored resources that maintain significance for their architectural qualities; however, the historian also tried to determine if any historic agricultural, residential, or commercial districts extended into the Project APE. No such districts were identified during the survey effort.

The Survey resulted in the documentation of 322 historic-age resources on 128 properties located within the Project APE (**Appendix V**). All of the documented resources are located in Deuel County and none of the resources are located in the Physical APE. Of these resources, one is currently NRHP-listed (Site ID 28271), and one has been previously determined NRHP eligible (Site ID 667). A second previously determined NRHP-eligible property (Site ID 55844) is now recommended not eligible for NRHP inclusion due to the collapse of a former barn. An additional two newly recorded properties, Site ID 70331 and Site ID 70359, include resources recommended for NRHP inclusion. The remaining resources lack historical associations and architectural integrity and are not recommended for NRHP inclusion. No NRHP-listed or eligible

resources will be adversely affected by the Project because their settings do not contribute to their significance and because the Project will not result in direct physical impacts.

15.5.4 Cultural Resource Impacts

For cultural resources identified during the surveys, recommendations regarding their NRHP-eligibility were made as shown in **Tables 15.5.1.1, 15.5.1.2, and 15.5.2**. All sites or historic architectural resources determined to be NRHP-eligible, or potentially eligible (unevaluated), are avoided by Project Facilities. Thus, no impacts are anticipated.

15.5.5 Mitigation Measures for Cultural Resource Impacts

No mitigation measures are proposed because the Project Layout avoids impacts to cultural resources. An Unanticipated Discovery Plan is provided in **Appendix W** outlining the procedures to follow to address any unanticipated discoveries of cultural resources during Project construction, including previously undiscovered archaeological sites and possible human remains.

If potential or confirmed human remains are identified during construction of the Project, work will immediately halt in the vicinity of the site and the Deuel County Sheriff's office will be contacted. If the remains are determined not to be part of an active crime scene or investigation, the South Dakota Chief Archaeologist will be contacted. If the state archaeologist's review establishes a direct relationship between the discovered remains or cultural resources and a tribal group, the director of the South Dakota State Historical Society will be notified, who will then initiate contact with officials of the tribal group. The 50-foot radius around the discovery site will be protected from further disturbance and degradation until the above listed parties are notified, consulted on the Project, and a scope of work is devised under which the Project may proceed.

15.5.6 Tribal Communication

South Deuel Wind notified Tribes in the vicinity of the Project Area of the Project via correspondence on November 16, 2023. A sample of this correspondence is included in **Appendix D**. South Deuel Wind provided details of the Project and offered the opportunity to review the Project's cultural resource survey results. To date, representatives from the Flandreau Santee Sioux Tribal Office and the Sisseton Wahpeton Oyate Tribal Historic Preservation Office have responded. South Deuel Wind has provided tribal representatives with survey results and will continue to coordinate with the Tribes regarding implementation of BMPs during construction and operations.

16. Employment Estimates (ARSD 20:10:22:24)

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

As discussed in Section 15.1.2.1, South Deuel Wind is expected to create approximately 109 temporary construction jobs for Deuel County and 243 temporary construction jobs for South Dakota during construction. At peak construction, approximately 200 employees are anticipated to be on-site. Employees hired during construction will include skilled labor, such as foremen, carpenters, iron workers, electricians, millwrights, and heavy equipment operators, as well as unskilled laborers. During operations, South Deuel Wind is expected to employ approximately eight full-time employees. Employees hired during operation will turbine technicians, facility manager(s), and administrative personnel as necessary.

It is likely that general skilled labor is available in Deuel County or the state at a scale necessary to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for certain components of Project construction, which may 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 jobs by classification and annual employment expenditures during construction are provided in **Table 16a**.

Table 16a Anticipated Construction Jobs and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Crane operators	12	$90,000 - $150,000
Civil workers	37	$75,000 - $100,000
Construction managers	5	$100,000 - $130,000
Collection workers	30	$70,000 - $85,000
Tower erectors	43	$65,000 - $85,000
Transmission workers	36	$60,000 - $75,000
Substation workers	30	$70,000 - $95,000
Foundation workers	24	$60,000 - $85,000
Testing & inspections	16	$60,000 - $85,000
Design engineers	10	$60,000 - $85,000

The estimated number of jobs by classification and annual employment expenditures during operation are provided in **Table 16b**. Annual estimated employment expenditures are anticipated to be the same for each of the first 10 years of commercial operation. South Deuel Wind estimates that employees will reside locally, likely within Deuel County, during operation of the Project.

Table 16b Anticipated Operation Jobs and Employment Expenditures		
Job Classification	**Number**	**Estimated Annual Salary**
Facility managers	1	$90,000 - $135,000
Wind turbine technicians	5 - 6	$55,000 - $90,000
Administrative personnel	1	$50,000 - $65,000

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

ARSD 20:10:22:25. Future additions and modifications. *The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.*

Apart from the final micro-siting flexibility requested in Section 4.2, South Deuel Wind does not currently have any plans for future additions to or modifications of to the Project.

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

ARSD 20:10:22:33.01. Decommissioning of wind energy facilities -- Funding for removal of facilities. *The applicant shall provide a plan regarding the action to be taken upon the decommissioning and removal of the wind energy facilities. Estimates of monetary costs and the site condition after decommissioning shall be included in the plan. The commission may require a bond, guarantee, insurance, or other requirements 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.*

South Deuel Wind prepared a Decommissioning Plan (**Appendix X**) and estimated cost analysis for the Project. The detailed decommissioning cost estimate is provided in **Appendix B** of the Decommissioning Plan. The analysis assumed 57 Vestas 163-4.5 turbines with salvage value but no resale value. The Vestas 163-4.5 turbine model was chosen because, at the time of the Decommissioning Plan, the turbine model is anticipated to be the most optimal turbine for the site. Overall, the estimated net decommissioning cost (in 2023 U.S. dollars) for the Project is $1,299,950. The decommissioning cost per wind turbine is estimated to be $22,806. Methodology for the estimates is provided in **Appendix X**. While the Commission has typically required an escrow account for financial assurance for decommissioning costs, the Commission recently approved bonds for wind energy facilities in 2021 and 2022 during those projects' ten-

year review. [14] South Deuel Wind respectfully requests that the Commission authorize the posting of a bond for financial assurance for decommissioning costs for the Project.

Deuel County also has a decommissioning requirement. South Deuel Wind will be responsible for covering all anticipated decommissioning costs and will submit a Decommissioning Plan to Deuel County within 120 days of construction completion, outlining the anticipated decommissioning process as per Ordinance Section 1215.09(b) (**Appendix B**). By granting the CUP, the Deuel County Board of Adjustment found that South Deuel Wind's compliance with ARSD 20:10:22:31.01 will be deemed to comply with Ordinance Section 1215.09(b).

South Deuel Wind anticipates that the operational life of the Project will be approximately 30 years. At the end of commercial operation, South Deuel Wind will assess whether to decommission the Project or seek to extend the life of the Project. Subject to applicable regulatory approval, should South Deuel Wind decide to pursue continued operations, it will evaluate whether to continue with the existing equipment or to upgrade the facility with newer technologies.

19. Reliability and Safety (ARSD 20:10:22:33.02)

19.1 Wind Energy Facility Reliability and Safety

Reliability (availability) as related to wind energy is defined as the percentage of time that a turbine will be functioning at full capacity during appropriate wind conditions at a site with specified wind resource characterization for a specified period of time, such as the life of the facility (Hill et al. 2008). South Dakota has some of the nation's greatest wind resources and the site of South Deuel Wind, in particular, boasts an abundance of wind resources.

Invenergy has over 20 years of operational experience and 1,200 highly skilled operations personnel. Invenergy Services currently operates 116 wind projects totaling over 12,000 MW in capacity and maintains a fleetwide wind turbine availability of approximately 97 percent, significantly exceeding industry benchmarks. Each member of the Invenergy Services team receives an average of 65 hours of safety training annually, totaling over 42,000 hours fleet wide. Invenergy approaches operations with an owner's mindset by maintaining projects in top working condition to ensure optimal performance. Invenergy's comprehensive service capabilities are supported by dedicated staff continuously monitoring and improving the performance of the fleet. Performance monitoring includes fault analysis, predictive analysis, and condition monitoring. Additional staff are dedicated to monitoring blades, gearboxes, generators, and oils/greases, and monitoring the fleets' centralized SCADA system. Invenergy's commitment to safety and excellence has earned the company the American Wind Energy Association Award for Achievement in Operations three times.

[14] *See In the Matter of the Application by PrairieWinds SD1, Inc., A Subsidiary of Basin Electric Power Cooperative, for a Wind Energy Facility Permit for the PrairieWinds SD1 Wind Farm and Associated Facilities, Docket No. EL09-028; In the Matter of the Application by Buffalo Ridge II LLC a subsidiary of Iberdrola Renewables, Inc., for an Energy Conversion Facility Permit for the Construction of the Buffalo Ridge II Wind Farm and Associated Collection Substation and Electric Interconnection System, Docket No. EL08-031.*

To further improve reliable operation of the MISO regional transmission system, wind energy projects are required to provide MISO with short-term forecasts of wind speed and energy that will be produced. Typically, wind projects provide a next-day, next-hour, and next-15 minutes forecast, updated every 15 minutes to MISO. These predictions of energy generation, through in-depth, site-specific weather forecasting, are used to integrate wind energy into the region's transmission system and to schedule turbine and transmission maintenance windows, improving overall reliability.

The Project is located in a rural setting in an area of low population density; construction and operation of the Project will have minimal impacts on the security and safety of the local population. South Deuel Wind will communicate regularly during construction and operation with local first response agencies and coordinate training meetings in accordance with the Project's ERP. The following safety measures will be taken to reduce the chance of physical and property damage, as well as personal injury, at the site:

- Turbines will be set back from residences, businesses, public buildings, public rights-of-way, and property lines as described in Section 5.2;
- Security measures will be implemented during the construction and operation of the Project, including temporary and long-term operational fencing, warning signs, and locks on Project Facilities;
- Routine maintenance and inspections will be conducted;
- Safety training will be conducted, and standardized practices will be implemented for construction crews and on-site personnel;
- Turbine tower exteriors will be designed to be unclimbable;
- A professional engineer will certify that foundation and tower designs are within accepted professional standards for the localized soil and climate conditions;
- Before excavation begins, the construction contractor will coordinate with the South Dakota One-Call program to avoid impacts to existing underground infrastructure;
- Following construction, South Deuel Wind will register the appropriate underground facilities with the South Dakota One-Call program;
- Each turbine location and the O&M Facility will be registered with a rural address identifier (fire number) as outlined in the South Dakota Rural Addressing Procedural Handbook;
- The Project will be monitored to detect icing conditions on turbine blades by evaluating meteorological data, identifying deviations in turbine power curves, and visual inspections. If significant icing accumulation is identified, the affected turbine(s) will be shut down automatically either by the control system or manually by O&M personnel. Turbines will return to normal operation once icing is no longer a concern.

The Project will generate minimal waste as a result of operation, and all required permits for handling contaminants will be obtained.

19.2 Transmission Facility Reliability and Safety

Transmission lines are designed to operate for decades, and typically require only moderate maintenance. The transmission facility may remain in use or be repurposed after the operational life of the wind energy facility. The transmission facility will include very few mechanical elements, which results in high reliability. The infrastructure is built to withstand weather

extremes and the circuits are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, over 99 percent.

The transmission facility will be designed and constructed in compliance with state, county, and utility standards regarding clearance to ground, clearance to utilities, clearance to buildings, strength of materials, and ROW widths. Temporary guard or clearance structures will be installed as needed over existing distribution or communication lines, roads, navigable waterways, or other obstructions after the necessary notifications are made or permits obtained.

The transmission facility will be equipped with protective devices, such as breakers and relays, for safety purposes. Breakers and relays will be located where the transmission facility connects to the Interconnection Switchyard and will de-energize the line in the event of an emergency. In addition to protective devices, proper signage will be posted warning the public of the safety risks associated with energized equipment.

19.3 Electric and Magnetic Fields

Natural and manmade electric and magnetic fields ("EMF") 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 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, which arise from the general wiring and appliances located in a typical home. Electric fields are present wherever there is an electric charge. A magnetic field arises when this charge is in motion, such as when electrons flow to generate an electric current.

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. Toxicological and laboratory studies have not shown a biological mechanism between EMF and cancer or other adverse health effects. In 2007, the World Health Organization ("WHO") conducted 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 extremely low frequency ("ELF") magnetic fields and changes in biological function or disease status" (WHO, 2007).

The frequency of transmission line electric and magnetic fields in the U.S. is 60 Hz and falls in the ELF range of the electromagnetic spectrum (any frequency below 300 Hz). For the lower frequencies associated with transmission lines, the two fields (electric and magnetic) 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. Both measurements rapidly decrease with distance from the source. Expected EMF measurements for the Gen-Tie Line will range within standard values for a transmission line, with the electric fields estimated at 10.3 kilovolts per meter ("kV/m") within the Gen-Tie Line

ROW, decreasing to 1.6 kV/m at its edge. Magnetic fields are estimated to be at 130 mG within the ROW, decreasing to 25.7 mG at its edge.

Induced (stray) voltage issues are generally caused by improperly grounded and/or isolated electrical circuits found in older buildings, factories, or barns. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences, and are typically grounded properly. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Appropriate measures, such as proper grounding, will be implemented to prevent stray voltage problems.

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

ARSD 20:10:22:33.02. Information concerning wind energy facilities. *If a wind energy facility is proposed, the applicant shall provide the following information:*
(1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color;
(2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years;
(3) Any warning lighting requirements for the wind turbines;
(4) Setback distances from off-site buildings, rights-of-way of public roads, and property lines;
(5) Anticipated noise levels at the exterior of all occupied residences located within the affected area during construction and operation;
(6) Anticipated electromagnetic interference during operation of the facilities;
(7) The proposed wind energy site and major alternative site locations 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 underground collection facilities are placed, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.

Please refer to the Completeness Checklist in Section 1.4.1 for ARSD requirement details. Requirements specific to ARSD 20:10:22:33.02 are addressed in various sections of the Application, as indicated in **Table 20**.

Table 20 Information Concerning Wind Energy Facilities	
Information Request	**Section**
(1) Configuration of the wind turbines	Sections 4.2.1 through 4.2.7
(2) Number of wind turbines	Section 4.2
(3) ADLS requirements for wind turbines	Sections 4.2.15 and 4.4.9
(4) Setback distances	Section 5.2
(5) Noise levels during construction and operation	Section 11.3, **Appendix M**
(6) Electromagnetic interference	Section 11.6
(7) Proposed site and major alternatives	Section 5 and Figures 2 and 4 of **Appendix A**
(8) Reliability and safety	Section 19.1
(9) Right-of-way or condemnation requirements	Sections 4.3 and 5.3
(10) Clearing activities	Sections 4.4.2 and 9.1.2
(11) Configuration of interconnection towers and poles	Sections 4.2.10 and 4.5
(12) Conductor and structure configurations	Sections 4.2.10 and 4.5
(13) Underground electric interconnection facilities	Sections 4.2.8 and 4.4.5

21. Information Concerning Transmission Facilities (ARSD 20:10:22:35)

ARSD 20:10:22:35. Information Concerning Transmission Facilities*. If a transmission facility is proposed, the applicant shall provide the following information:*
(1) Configuration of the towers and poles, including material, overall height, and width;
(2) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower;
(3) The proposed transmission site and major alternatives as depicted on overhead photographs and land use culture maps;
(4) Reliability and safety;
(5) Right-of-way or condemnation requirements;
(6) Necessary clearing activities; and
(7) If the transmission facility is placed underground, the depth of burial, distance between access points, conductor configuration size, and number of circuits.

Please refer to the Completeness Checklist in Section 1.4.1 for ARSD requirement details. Requirements specific to ARSD 20:10:22:35 are addressed in various sections of the Application, as indicated in **Table 21**.

Table 21 Information Concerning Transmission Facilities	
Information Request	**Section**
(1) Configuration of towers and poles	Sections 4.2.10 and 4.5
(2) Conductor configuration and size, length of span, and number of circuits	Sections 4.2.10 and 4.5, Figure 3 in **Appendix A**
(3) Proposed transmission site and major alternatives	Section 5.2
(4) Reliability and safety	Section 19.2
(5) Right-of-way or condemnation requirements	Sections 4.3 and 5.3
(6) Necessary clearing activities	Section 4.5
(7) Underground dimensions	Sections 4.2.8 and 4.4.5

22. Additional information in Application (ARSD 10:22:36)

ARSD 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

The Project must comply with federal, state, and local laws requiring permits or approvals. The potential permits or approvals that have been identified as being required for the construction and operation of the Project are provided in **Table 22.1**.

Table 22.1 Potentially Applicable Permits and Approvals			
Agency	**Permit/Approval**	**Notes**	**Status**
Federal			
Federal Aviation Administration	Notice of Proposed Construction or Alteration (Form 7460-1)	Required for any proposed construction over 200 feet above ground level.	Ongoing
Federal Aviation Administration	Notice of Actual Construction or Alteration (Form 7460-2, Part 1 and/or 2)	Supplemental notice in advance of or after commencing construction of turbines.	Not started
Federal Aviation Administration	Marking and Lighting Recommendations	Required for approval of light-mitigating technology.	Not started
United States Department of Commerce – National Telecommunications and Information Administration	NTIA Letter of Concurrence	No interference with federal communication systems anticipated.	Not started
United States Army Corps of Engineers	Section 404 Wetland Permit	The Project is designed to avoid impacts to jurisdictional water resources to the extent practicable. The final Project footprint will be evaluated to determine the appropriate authorization for impacts, if any.	Not started
United States Fish and Wildlife Service	Coordination	Coordination on federally listed species or designated critical habitats.	In progress
United States Environmental Protection Agency	Spill Prevention, Control, and Countermeasure Plan	Required prior to storage of oil products greater than 10,000 gallons.	Not started
State			
South Dakota Public Utilities Commission	Energy Facility Permit	Required for wind energy facility.	In progress
South Dakota Public Utilities Commission	Energy Facility Permit	Required for transmission facility.	In progress
South Dakota State Historic Preservation Office	SDCL 1-19A-11.1 Consultation	Determination of effect on archaeological and historical resources.	In progress
South Dakota Department of	Section 401 Water Quality Certification	The Project is designed to avoid impacts to water resources to	Not started

Table 22.1 Potentially Applicable Permits and Approvals			
Agency	**Permit/Approval**	**Notes**	**Status**
Agriculture and Natural Resources		the extent practicable. The final Project footprint will be evaluated to determine the appropriate authorization for impacts, if any.	
South Dakota Department of Agriculture and Natural Resources	National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activities	Required for land disturbance or construction activities that disturb one or more acres with a point source discharge to surface waters of the United States.	Not started
South Dakota Department of Agriculture and Natural Resources	General Permit for Temporary Discharges	Temporary permit for the use of public water for construction dewatering.	Not started
South Dakota Department of and Natural Resources	Temporary Water Use Permit for Construction Activities	Temporary permits for the use of public water for construction, testing, or drilling purposes; issuance of a temporary permit is not a grant of water right.	Not started
South Dakota Department of and Natural Resources	Water Rights Permit for Non-irrigation Use	Required if water will be appropriated for O&M building.	Not started
South Dakota Department of Agriculture and Natural Resources	Septic System Plan Approval	Review and approval required if O&M building septic system is not “conventional.”	Not started
South Dakota Electrical Commission	Electrical Inspection	Required for O&M building.	Not started
South Dakota Game, Fish, and Parks	Coordination	Resource coordination.	In progress
South Dakota Department of Transportation	Aeronautical Hazard Permit	Permit lighting plan determined with FAA coordination.	Not started
South Dakota Department of Transportation	Utility Permit	Permit required for any utility crossing or use within state road right-of-way.	Not started
South Dakota Department of Transportation	Highway Access Permit	Permit required for any access roads abutting state roads.	Not started

Table 22.1 Potentially Applicable Permits and Approvals			
Agency	**Permit/Approval**	**Notes**	**Status**
South Dakota Department of Transportation	Oversize/Overweight Permit	Permit required for heavy equipment transport over state roads during construction.	Not started
Local			
Deuel County	Conditional Use Permit for a Wind Energy System	Permit required for construction of a wind energy system.	Complete
Deuel County	Individual Building Permits	Permit required for construction of each turbine and building.	Not started
Deuel County	Utility Permits	Required for use and crossing of county roads.	Not started
Deuel County	Occupancy Right of Way of County Highways Permit	Permit required for use of county highway rights-of-way.	Not started
Deuel County	Driveway or Approach Construction Permits	Permit required for building any entrance off county highway.	Not started
Deuel County	Overweight/Oversize Permit	Permit required for operating any vehicle above the maximum weight and/or size set in SDCL Chapter 32-22.	Not started

22.2 Agency Coordination

Throughout Project planning and development, South Deuel Wind has coordinated with various federal, state, and local agencies to identify potential concerns regarding the Project. A summary of the primary agency meetings completed to date is provided below. Substantive agency correspondence and meeting summaries are provided in **Appendix D**.

22.2.1 United States Fish and Wildlife Service and South Dakota Game, Fish, and Parks

South Deuel Wind has been coordinating with the USFWS and SDGFP since 2016 as part of the Project development process. South Deuel Wind and the agencies have had numerous discussions that included the sharing of public data on sensitive resources, environmental survey methods and results, and the incorporation of survey results into the Project design.

The USFWS Information, Planning, and Conservation System (IPaC; USFWS 2023a) report (2015, 2017 and 2018) and South Dakota Environmental Review query (SDGFP 2023b) (2016 and 2022) were generated and reviewed to conduct an initial review of the Project area. The IPaC and South Dakota Environmental Review query were again completed in 2022 and 2023 to reflect the updated Project Area.

On March 31, 2016, South Deuel Wind conducted an online presentation and call with the USFWS Madison Wetlands Management District ("WMD") to introduce the Project, discuss proposed avian and bat surveys, and to determine if existing grassland and wetland easements

may occur in the Project area. On April 4, 2016, a Project area shapefile was shared with the WMD to identify any USFWS easements. South Deuel Wind had a follow-up phone conversation with the WMD on August 4, 2016, to discuss the USFWS easement resources identified in the Project area, which South Deuel Wind has sited its facilities to avoid.

South Deuel Wind submitted an information request to USFWS South Dakota Ecological Services Field Office and a Natural Heritage Information System ("NHIS") data request to the SDGFP on June 20, 2016, for information on state and federally listed species and sensitive natural resources within the 2016 Project area. The USFWS responded to the environmental review request in a letter dated August 16, 2016. The USFWS's August 16, 2016 response stated that the federally threatened NLEB (*Myotis septentrionalis*) occurs within Deuel County, and some hibernacula has been documented in caves and mines in the Black Hills along the western border of South Dakota, and the species has also been documented in other areas of the state during summer and along the Missouri River in the center of South Dakota during migration. Four other records of sensitive species were noted including: the Topeka shiner (*Notropis topeka*, federally endangered), Poweshiek skipperling (*Oarisma poweshiek*, federally endangered), Dakota skipper (*Hesperia dacotae*, federally threatened), and the rufa red knot (*Calidris canutus rufa*, federally threatened). No other records of significant natural features were noted in the vicinity of the Project area. The SDGFP responded to the NHIS request letter on August 10, 2016. The SDGFP letter stated the federally endangered Poweshiek skipperling and the federally threatened Dakota skipper have been documented in Deuel County. No other state or federally listed species were included in the SDGFP response letter.

South Deuel Wind also met with the USFWS and SDGFP on August 12, 2016 to provide an overview of the Site Characterization Study, preliminary results of baseline studies, and discuss additional proposed surveys. The USFWS agreed with the separate survey effort for large and small birds and asked if any survey points were located in grassland away from roads. South Deuel Wind confirmed that breeding bird surveys were conducted in grassland habitat in June 2016. The USFWS reviewed the NLEB mist-net protocol and confirmed it followed the 2016 Range Wide Indiana Bat Summer Survey Guidelines. Lastly, SDGFP asked if lek surveys were proposed for the greater prairie chicken (*Tympanuchus cupido*) and committed to providing known lek locations to South Deuel Wind.

On May 25, 2017, South Deuel Wind conducted an online presentation and call with the USFWS South Dakota Ecological Services Field Office and SDGFP. The aim was to review the Project area at that time, review the Year 1 avian study results, and discuss the Year 1 bat survey methods, including acoustic and mist-netting surveys. South Deuel Wind indicated that the next surveys planned may include Year 2 of large bird use surveys, raptor nest surveys, wetland delineations, and assessments for grasslands. The USFWS recommended that South Deuel Wind continue with additional studies and consider avoiding grasslands and focus turbine siting in croplands. South Deuel Wind confirmed to be minimizing impacts to grasslands to the extent practicable and planning on conducting additional studies. The USFWS further recommended that South Deuel Wind avoid placing turbines between wetlands. The USFWS stated approval of the ongoing survey protocols and requested that South Deuel Wind consult the Region 3 guidelines on Dakota skipper habitat features as they had been updated. The USFWS also stated that greater prairie chicken leks are unlikely to occur within the Project area.

Also in 2017, a site visit was conducted, prompted by a request from the USFWS and SDGFP. This visit was completed at the Project area by the USFWS with South Deuel Wind on June 27, 2017, to further review site characteristics and potential environmental areas of concern. The USFWS reiterated its recommendation to minimize impacts to intact grasslands and to minimize impacts to waterfowl by siting turbines away from wetland clusters to the extent practicable. The SDGFP was unable to attend the site visit.

South Deuel Wind met with the USFWS and SDGFP on February 18, 2018 to discuss the results of the biological surveys that were conducted after the 2017 meeting, and to discuss updates to the Project siting as a result of engineering, stake holder interests, and environmental considerations. This meeting included a review of updates to completed and continued studies, including avian use surveys and bat acoustic surveys. South Deuel Wind indicated there would be additional surveys in the future to assess the Project area for grasslands and avoid impacts to those areas to the extent practicable, as well as raptor nest surveys and assessments for protected butterfly species if needed. South Deuel Wind reaffirmed a commitment to minimizing impacts, especially to grasslands and wetlands.

South Deuel Wind met with the USFWS and SDGFP on May 12, 2022, to provide an update on Project development and environmental surveys that would be completed in the near future. Results from Year 3 large bird use surveys were reviewed, and it was noted these studies were ongoing through June 2022. Additionally, South Deuel Wind stated that a raptor nest survey was completed, and passive bat acoustic surveys were underway in 2022 for the Project area. South Deuel Wind stated that grassland and habitat assessment surveys were underway for protected butterfly species, but presence/absence surveys were not planned at this time. The SDGFP advised that an updated request to the Natural Heritage Database should be completed. This was subsequently completed in updates to the Project's Site Characterization Study. The USFWS suggested coordination with additional USFWS offices, specifically the WMD, to review USFWS easement information for wetlands and grassland easements. The SDGFP also stated that greater prairie chicken lek surveys are not likely needed for this Project and suggested SDGFP GPA, WPA, and WIHA be considered in siting where possible. South Deuel Wind included considerations for USFWS easements and SDGFP identified areas for Project design in subsequent surveys.

South Deuel Wind received written siting recommendations from SDGFP on October 3, 2022 that included eleven species of special concern as potentially occurring within 5 miles of the Project Area. Four of the eleven included species have statuses as threatened or endangered under federal or state statues including: Topeka shiner, Poweshiek skipperling, Dakota skipper, and the northern redbelly dace (*Chrosomus eos,* state threatened). Native grasslands, wetlands, fish species, and public lands were also included in the letter as other items to consider in the siting of the design. On October 25, 2022, the USFWS shared updated easement data with the Project as part of a data request, which have been incorporated into the Project design.

On September 26, 2023, South Deuel Wind contacted the USFWS Madison WMD to request maps of USFWS easements that were mentioned by the USFWS in 2022, that cross the Project Area. The USFWS responded on September 26, 2023, with the easement contracts and maps for

the easements within the Project Area. The USFWS also confirmed that any wetland easement identified on a WPA, WMA, or other parcel with USFWS easements is specific to the delineated wetland basin on the parcel as shown in the easement maps and that only grassland easements are applied to the full parcel. South Deuel Wind then digitized the easement boundaries to inform infrastructure siting and provided the boundaries as a Keyhole Markup Language Zip ("KMZ") geospatial file to the USFWS on October 6, 2023. On October 10, 2023, the USFWS completed their review of the KMZ and confirmed the content was accurate and aligned with Madison WMD's interpretation of the data. South Deuel Wind has sited facilities to avoid USFWS easements.

South Deuel Wind met with the USFWS and SDGFP on October 11, 2023 to discuss the biological studies that had occurred since the meeting in 2022 and to share the updated Project Area. The objective of the meeting was to demonstrate how data is being incorporated into the Project design since all wildlife studies were concluded and data was compiled. South Deuel Wind presented a summary figure of environmental data and siting setbacks incorporated by the Project, which included turbine placement avoiding unbroken grasslands and potentially suitable habitat for protected butterfly species, eagle nests, great horned owl nests, a red-tailed hawk nest, and potential northern long-eared bat summer roosting habitat. There was no additional information or other actions requested from the USFWS or SDGFP directly after or since this meeting.

22.2.2 South Dakota State Historic Preservation Office

SHPO consultation was conducted outside of Section 106 of the National Historic Preservation Act of 1966. SHPO also communicated that it does not have the expertise to recommend an APE or assess the effects of the proposed Project to places of religious and cultural significance to American Indian tribes. A Level III Archaeological Survey (**Appendix U - Confidential**) was conducted for the Component Footprint and a Historic Architectural Resources Reconnaissance Survey (**Appendix V**) was conducted for the Project APE. Both surveys have been provided to SHPO prior to the filing of this Application. For any cultural resources identified during the surveys, a recommendation of NRHP-eligibility of the resource has been made. Sites determined to be NRHP-eligible will be avoided by the Project. If a site cannot be avoided, South Deuel Wind will work with SHPO to develop appropriate minimization or mitigation measures. As discussed in Section 15.5.6, South Deuel Wind also sent a letter to notify tribes in the vicinity of the Project Area, provide details of the Project, and offer the opportunity to review the Project's cultural resource survey results. To date, representatives from the Flandreau Santee Sioux Tribal Office and the Sisseton Wahpeton Oyate Tribal Historic Preservation Office have responded. South Deuel Wind has shared survey results and will continue coordinating with the Tribes on implementing BMPs during construction and operations.

22.2.3 Deuel County

South Deuel Wind has consulted with Deuel County representatives through meetings, phone calls, and electronic communications. The primary topics of these coordination efforts are summarized below.

- Project summary and status update presentations to Deuel County Commissioners and Board of Adjustment;

- Communications with County Administration regarding the Deuel County Conditional Use Permit that was submitted July 2023, and approved on September 11, 2023; and
- Communications with County Administration, Township representatives, and the County Highway Superintendent on Road Use Agreements, building permits, and any pre-construction meetings and notifications.

22.3 Public and Agency Comments

As discussed in Section 5, several potential Project sites in South Dakota were considered before the Project Area was selected. South Deuel Wind considered input from agencies and the public in siting the Project Area and in identifying potential turbine locations. Some of the adjustments made during Project siting and design, in response to comments, included:

- Avoidance of impacts to state and federal lands within or near Project Area, to the extent practicable;
- Micro-siting Project Facilities in coordination with landowners; and
- Avoidance or minimization of impacts to unbroken grasslands, wetlands, and other habitats within or near the Project Area.

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

As described in Section 1.4, South Deuel Wind has addressed the matters set forth in SDCL Ch. 49-41B and in ARSD Ch. 20:10:22, related to wind energy facilities and transmission facilities.

South Deuel Wind's burden of proof is set forth in SDCL 49-41B-22. South Deuel Wind has established that:

1. The facility complies 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 to the views of governing bodies of affected local units of government.

23. Testimony and Exhibits (ARSD 20:10:22:39)

South Deuel Wind is submitting testimony and exhibits in support of this Application. The individuals identified in **Table 23** are providing testimony in support of the Application. South Deuel Wind reserves the right to provide supplemental and/or rebuttal testimony, as needed, to further support this Application.

Table 23 Individuals Providing Testimony

Individual	Title	Company	Subject Matter
Aidan O'Connor	Manager, Renewable Development	Invenergy LLC	Permitting management and compliance
Monica Monterrosa	Director, Renewable Development	Invenergy LLC	Project development and cultural resources
Michelle Phillips	Manager, Environmental Compliance and Strategy	Invenergy LLC	Environmental and wildlife
Alexandra Thompson	Senior Project Engineer, Renewable Engineering	Invenergy LLC	Engineering
Michael Hankard	President and Principal	Hankard Environmental, Inc.	Noise
JoAnne Blank	Senior Scientist and Project Manager	Stantec Consulting Services Inc.	Shadow flicker
Michael MaRous	President	MaRous & Company	Property values
David Loomis	President	Strategic Economic Research, LLC	Economic benefits

23.1 Applicant Verification

Daniel Litchfield, being duly sworn, deposes and states that he is an Authorized Representative of South Deuel Wind and is authorized to sign this Application on behalf of the Deuel Harvest Wind Energy South LLC.

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

Dan Litchfield, Authorized Signatory

Dated this 28th Day of June, 2024.

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