Application to the South Dakota Public Utilities Commission for Facility Permits

Sweetland Wind Farm, LLC

Sweetland Wind Farm Project
Burns & McDonnell Project No. 103828

Final
3/6/2019

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prepared by

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ACSR	Aluminum Conductor Steel Reinforced
ADLS	Aircraft Detection Lighting System
ADT	Average Daily Traffic
AMSL	Above Mean Sea Level
APE	Area of Potential Effects
APLIC	Avian Power Line Interaction Committee
Applicant	Sweetland Wind Farm, LLC
Application	Application for Facility Permit
ARMS	Archaeological Resource Management System
ARSD	Administrative Rules of South Dakota
ASOS	Automated Surface Observing System
BBCS	Bid and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BP	BP Alternative Energy
CFR	U.S. Code of Federal Regulations
Clipper	Clipper Windpower Development Company
Commission	South Dakota Public Utilities Commission
Cultural Resources Study Area	Cultural Resources Survey Area plus a 1-mile buffer
CWA	Clean Water Act

Abbreviation	Term/Phrase/Name
CWCTP	Cooperative Whooping Crane Tracking Project
dB	decibel
dBA	A-weighted decibels
DOE	U.S. Department of Energy
EA	Environmental Assessment
ECPG	Eagle Conservation Plan Guidance
EIA	U.S. Energy Information Administration
EMF	electromagnetic fields
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FMP	fall migration period
FONSI	Finding of No Significant Impact
Fund	Quinbrook Low Carbon Power Fund LP and Quinbrook Low Carbon Power Parallel Fund (US) LP
g	standard gravity
GE	General Electric
Gen-Tie Line	230-kV generation tie-in transmission facility
Guidelines	Range-Wide Indiana Bat Summer Survey Guidelines
GW	gigawatts
HON	Huron Regional Airport
Hz	Hertz

Abbreviation	Term/Phrase/Name
ICNIRP	International Commission on Non-ioning Radiation Protection
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPaC	Information for Planning and Conservation
IRAC	Interdepartmental Radio Advisory Committee
JV	Joint Venture
km	kilometers
Ksat	saturated hydraulic conductivity
kV	kilovolt
kW	kilowatts
L_{90}	sound level exceeded 90 percent
L_{eq}	sound equivalence level
L_{dn}	sound exceedance levels where "$_n$" is a value (typically an integer between 1 and 99) in terms of percentage
LNTE	Low-Noise Trailing Edges
MBTA	Migratory Bird Treaty Act
MERRA-2	Modern Era Retrospective-Analysis for Research and Application
mG	milliGauss
MOA	Memorandum of Agreement
mph	miles per hour
m/s	meters per second
MVA	megavolt-ampere
MW	megawatt

Abbreviation	Term/Phrase/Name
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NIEHS	National Institute of Environmental Health Sciences
NLCD	National Land Cover Database
NLEB	northern long-eared bat
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NTIA	National Telecommunication Information Agency
NWP	Nationwide Permit
O&M	operations and maintenance
PAB	palustrine aquatic bed
PCM	post-construction monitoring
PCN	pre-construction notification
PEM	palustrine emergent
PFO	palustrine forested
PGA	peak ground acceleration
PPA	Power Purchase Agreement
Project Area	approximately 20,979-acre area in Hand County

Abbreviation	Term/Phrase/Name
PTC	Production Tax Credit
PUB	palustrine unconsolidated bottom
R4/R5	Riverine Intermittent/Ephemeral
RLOS	radar line of sight
RPSs	renewable portfolio standards
RUSLE	Revised Universal Soil Loss Equation
SAIPE	Small Area Income and Poverty Estimates
SCADA	supervisory control and data acquisition
SDARC	South Dakota Archaeological Research Center
SDCL	South Dakota Codified Law
SDDENR	South Dakota Department of Environment and Natural Resources
SDDLR	South Dakota Department of Labor and Regulation
SDDOA	South Dakota Department of Agriculture
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Game, Fish and Parks
SDGS	South Dakota Geological Survey
SDPUC	South Dakota Public Utilities Commission
SGCN	South Dakota Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SOI	U.S. Secretary of the Interior
SPP	Southwest Power Pool
Study Area	23,642-acre area in Hand County, which includes the Project Area

Abbreviation	Term/Phrase/Name
Sweetland	Sweetland Wind Farm, LLC
SWPPP	Storm Water Pollution Prevention Plan
TCP	traditional cultural property
THPO	Tribal Historic Preservation Office
TMDL	total maximum daily load
TWI	The Watershed Institute, Inc.
UGP PEIS	Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement
UPL	uplands
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USLE	Universal Soil Loss Equation
WAPA	Western Area Power Administration
WEG	Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
Wind Leases	Wind Energy Lease and Easement Agreements
WHO	World Health Organization
WPA	Waterfowl Production Area

COMPLETENESS CHECKLIST

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

Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(1-12)	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.	Chapters 4.0-28.0
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.	Chapter 4.0
49-41B-11(7)	20:10:22:07	**Name of owner and manager.** The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	Chapter 5.0

49-41B-11(8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	Chapter 6.0
49-41B-11(12)	20:10:22:09	**Estimated cost of facility.** The applicant shall describe the estimated construction cost of the proposed facility	Chapter 7.0
49-41B-11(9)	20:10:22:10	**Demand for facility.** The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	Chapter 6.0
49-41B-11(2)	20:10:22:11	**General site description.** The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	Chapter 8.0; Figures A-1, and A-9 in Appendix A; Appendix O
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.	Chapter 9.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:13	**Environmental information.** The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the facility. The environmental	Chapters 10.0-15.0, 17.0, 18.0, and 20.0

		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 (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.	Chapters 8.2, 8.3, and 11.0; Figures A-6, A-7a, A-7b, A-7c, and A-8 in Appendix A
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:	Chapter 12.0; Figure A-9 in Appendix A

		(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.	
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.	Chapter 13.0 and Figure A-10 in Appendix A
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	Chapter 14.0

		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.	
49-41B-11(2,11); 49-41B-22	20:10:22:18	**Land use.** The applicant shall provide the following information concerning present and anticipated use or condition of the land: (1) A map or maps drawn to scale of the plant, wind energy, or transmission site identifying existing land use according to the following classification system: (a) Land used primarily for row and nonrow crops in rotation; (b) Irrigated lands; (c) Pasturelands and rangelands; (d) Haylands; (e) Undisturbed native grasslands; (f) Existing and potential extractive nonrenewable resources; (g) Other major industries; (h) Rural residences and farmsteads, family farms, and ranches; (i) Residential; (j) Public, commercial, and institutional use; (k) Municipal water supply and water sources for organized rural water 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.	Chapters 15.0 and 20.0; Figures A-10 and A-11 in Appendix A; Appendix L
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	Chapter 16.0

		view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:20	**Water quality.** The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Chapter 17.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:21	**Air quality.** The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Chapter 18.0
49-41B-11(3)	20:10:22:22	**Time schedule.** The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.	Chapter 19.0
49-41B-11(11); 49-41B-22	20:10:22:23	**Community impact.** The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility 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.	Chapter 20.0

49-41B-11(4)	20:10:22:24	**Employment estimates.** The application shall contain the estimated number of jobs and a description of job classifications, together with the estimated annual employment expenditures of the applicants, the contractors, and the subcontractors during the construction phase of the proposed facility. In a separate tabulation, the application shall contain the same data with respect to the operating life of the proposed facility, to be made for the first ten years of commercial operation in one-year intervals. The application shall include plans of the applicant for utilization and training of the available labor force in South Dakota by categories of special skills required. There shall also be an assessment of the adequacy of local manpower to meet temporary and permanent labor requirements during construction and operation of the proposed facility and the estimated percentage that will remain within the county and the township in which the facility is located after construction is completed.	Chapter 21.0
49-41B-11(5)	20:10:22:25	**Future additions and modifications.** The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	Chapter 22.0
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.	Chapter 23.0 and Appendix P
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;	Chapters 8.0, 9.0, 24.0, and 25.0

		(3) Any warning lighting requirements for the wind turbines; (4) Setback distances from off-site buildings, right-of-ways of public roads, and property lines; (5) Anticipated noise levels during construction and operation; (6) Anticipated electromagnetic interference during operation of the facilities; (7) The proposed wind energy site and major alternatives as depicted on overhead photographs and land use culture maps; (8) Reliability and safety; (9) Right-of-way or condemnation requirements; (10) Necessary clearing activities; (11) Configuration of towers and poles for any electric interconnection facilities, including material, overall height, and width; (12) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower for any electric interconnection facilities; and (13) If any electric interconnection facilities are placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	
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.	Chapter 8.0
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; (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,	Chapters 8.0, 9.0, 24.0, and 26.0, and Figure A-4

		conductor configuration and size, and number of circuits.	
49-41B-22	N/A	**Applicant's burden of proof.** The applicant has the burden of proof to establish that: (1) The proposed facility will comply with all applicable laws and rules; (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area; (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government	Chapter 3.0 and Chapter 27.4
49-41B-7; 49-41B-22	20:10:22:36	**Additional information in application.** The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.	Chapter 27.0
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.	Chapter 28.0

1.0 INTRODUCTION

Sweetland Wind Farm, LLC (Sweetland or Applicant) is requesting Facility Permits from the South Dakota Public Utilities Commission (Commission) for an approximately 200-megawatt (MW) wind farm and associated facilities (Wind Farm), and an up to 7-mile 230-kilovolt (kV) generation tie-in transmission facility (Gen-Tie Line). The Wind Farm and Gen-Tie Line are collectively referred to as the Sweetland Wind Farm, or Project.

The Project would be situated within an approximately 20,979-acre area (Project Area) located southeast of the City of Miller in Hand County, South Dakota (Figure A-1 in Appendix A).

Project components would include:

- Up to 71 primary wind turbine locations and 15 alternate locations;
- Access roads to each wind turbine;
- An operations and maintenance (O&M) facility;
- Up to four permanent meteorological towers;
- Electrical power underground collection lines and communications system;
- A Project substation;
- An up to approximately 7-mile-long, 230-kV gen-tie line;
- A switchyard; and
- Additional temporary construction areas, including crane paths, pull sites, access roads, a batch plant, and a laydown yard.

The Project would interconnect with Western Area Power Administration's (WAPA's) existing Fort Thompson to Huron 230-kV transmission line, located in Township 110N, Range 66W, Hand County, South Dakota. The Applicant is proposing to construct a new, up to 7-mile long 230-kV gen-tie line in Hand County from the Project substation in Township 111N, Range 66W to a switchyard to interconnect with WAPA's line. Because execution of an interconnection agreement allowing the Project to interconnect to WAPA's system constitutes a federal action, WAPA is preparing an Environmental Assessment (EA) for the Project interconnection in accordance with the applicable requirements and standards of the National Environmental Policy Act (NEPA). While WAPA must analyze impacts of the entire Project, WAPA's federal action is limited to the approval of the proposed interconnection.

Sweetland Wind Farm, LLC is a Delaware limited liability company and a wholly owned subsidiary of Scout Clean Energy. Scout Clean Energy is a North American renewable energy development company

focused on utility scale wind development. The Scout Clean Energy team has an extensive track record developing large-scale wind energy projects. Scout Clean Energy was officially formed in July 2016 as an affiliate of Harvest Energy Services, Inc., which is an affiliate through common management. Scout Clean Energy and Harvest Energy Services are co-located at headquarters in Boulder, Colorado.

Project experience since Scout Clean Energy began in 2016 includes the Ranchero 300-MW project in Crockett County, Texas (under construction, anticipated Commercial Operations Date of September 2019) and the Persimmon Creek 200-MW project in Woodward County, Oklahoma (Commercial Operations Date of August 2018). Prior to forming Scout Clean Energy, members of the team were integral in the successful development, marketing, and financing of over 5 gigawatts (GW) of utility scale wind facilities across the United States and Canada.

Scout Clean Energy is a portfolio company of Quinbrook Low Carbon Power Fund LP and Quinbrook Low Carbon Power Parallel Fund (US) LP (collectively, the Fund). The Fund is an infrastructure fund with approximately $1 billion in capital raised with investments in the United States, Europe, and Australia. With support from the Fund, Scout Clean Energy has the experience, skills, personnel, financial backing, and proven capability to successfully manage wind project development, construction, and operations and maintenance.

2.0 PROJECT DEVELOPMENT SUMMARY

Sweetland met with the U.S. Fish and Wildlife Service (USFWS) late in 2016 to solicit feedback as to where the agency would recommend siting a project within the historical 500,000-acre Titan Wind Farm site. Based on recommendations from the USFWS, Sweetland identified the proposed approximately 23,642-acre Study Area in Pearl, Hulbert and Rose Hill Townships in Hand County, South Dakota. Ecological and cultural resources studies were performed for this 23,642-acre Study Area. Through consultation with the USFWS, the proposed Project location minimizes impacts to USFWS Wetland and Grassland Easements; avoids the Missouri River, historic sage grouse lek locations, and areas of historic avian and bat use; and is in an area of compatible land use (i.e., farming and ranching). The Project Area is 20,979 acres within the Study Area.[1]

2.1 Community Outreach and Land Acquisition

Sweetland's outreach efforts have included meeting with individual landowners, regulatory agencies, local government units, and the general public to discuss the Project and gathering and incorporating comments into the Project's planning, design, permitting, construction, and operation phases. The following paragraphs briefly summarize community outreach efforts since 2016:

- Sweetland began meeting in fall 2016 with landowners to discuss wind development on their property, with the first Wind Energy Lease and Easement Agreements (Wind Leases) voluntarily executed in November of the same year. As the site has a limited number of landowners (some of which are absentee), the Applicant met with the landowners one-on-one as opposed to having community meetings. The Project has 32 Wind Leases and 4 Good Neighbor Agreements with landowners.
- Sweetland presented Project updates to the Hand County Commission at meetings in 2017 and 2018. The Hand County Commission meetings allowed the public a forum to ask questions and voice concerns regarding the Project. The Project incorporated these comments and concerns into a Development Agreement voluntarily executed with Hand County in December 2018. A discussion of County permitting is provided in Sections 2.3 and 16.0.
- As part of the WAPA public comment process, WAPA held a Public Scoping Meeting for all interested parties at the Miller Community Center in Miller, South Dakota, on August 7, 2018. WAPA mailed a written letter to all landowners and other interested parties inviting them to attend the event to learn about the Project and submit any comments and concerns. The WAPA

[1] Note that the separate resources reports provided in the appendices refer to the "Study Area" as the "Project Area."

letter also provided mail, fax, and email contact information for the submittal of any comments on the Project. The Public Scoping Meeting was also announced via a newspaper ad in the Miller Press on July 18, July 25, and August 1, 2018.

- As a result of ongoing community outreach, Sweetland committed to the Hand County 4-H Leaders Association to sponsor upgrades/replacement of the electrical systems in the existing livestock areas, the exhibit building, and the show ring at the 4-H grounds in the City of Miller in Hand County. The existing electrical system was installed in the 1960s and does not meet current electricity demand at the facility.

Table 2-1 summarizes the outreach conducted to date on the Project.

Table 2-1: Community Outreach and Land Acquisition

Meeting	Dates
Landowner Meetings	November 2016 to present
County Zoning Board Meeting	February 1, 2017
Hand County Commission Meeting	May 2, 2017
County Zoning Board Meeting	July 11, 2017
Hand County Commission Meeting & County Zoning Board Meeting	October 3, 2017
Hand County Commission Meeting	January 2, 2018
Hand County Commission Meeting	February 6, 2018
Hand County Commission Meeting	April 3, 2018
Hand County Commission Meeting	July 3, 2018
WAPA Public Scoping Meeting	August 7, 2018
Hand County Commission Meeting	August 7, 2018
Hand County Commission Meeting	September 7, 2018
Hand County Commission Meeting	October 2, 2018
Hand County Commission Meeting	November 8, 2018
Hand County Economic Development Meeting	November 9, 2018
Hand County Commission Meeting	December 4, 2018

2.2 Summary of Agency Coordination

The Applicant has coordinated with various agencies throughout Project planning and development starting in fall 2016. Details regarding agency coordination are provided in Section 27.2 and Appendix B.

2.3 County Permitting

As noted above, the Applicant met with Hand County starting in winter 2017. As discussed further in Section 16.0, wind energy facilities (with the exception of the Project substation and switchyard) are considered a permitted use under Hand County's Zoning Ordinance (included in Appendix C). Therefore, a conditional use permit is required only for the Project substation and switchyard, and Hand County has requested that those conditional use permits be obtained after the Commission has issued Energy Facility Permits for the Project. In lieu of a conditional permit for the wind energy facility, Sweetland entered into a Development Agreement with Hand County, which was approved by the County Commission on November 8, 2018 and executed on December 4, 2018. A copy of the Development Agreement, which includes commitments regarding setbacks and sound and shadow flicker levels, also is provided in Appendix C.

2.4 Purchase and Off-take Agreements

The Applicant does not currently have a Purchase Agreement or Off-Take Agreement (such as a Power Purchase Agreement [PPA]) for the Project, but is currently in discussions with interested parties.

2.5 Environmental Analysis

The environmental studies, technical studies, and surveys for the Project are listed below in Table 2-2.

Table 2-2: Environmental Studies and Surveys for the Sweetland Wind Farm Project

Study	Date	Status[a]
Baseline Avian Study, Year 1 Studies	May 2017 to April 2018	Complete
Baseline Avian Study, Year 2 Studies	May 2018 to present	Ongoing
Bat Activity Study 2017 Report	June to October 2017	Complete
Bat Activity Study 2018 Report	May to October 2018	Complete
Bat Summer Presence/Absence Survey Report	November 14, 2018	Complete
Eagle and Raptor Nest Surveys 2017 (Year 1) Report	March and May 2017	Complete
Eagle and Raptor Nest Surveys 2018 (Year 2) Report	March and May 2018	Complete
Whooping Crane Stopover Habitat Assessment Report	December 2018	Complete
Native Grassland Habitat Report	July to September 2018	Complete
Wetland Delineation Report	June and October 2018	Complete
Cultural Resources Survey	October 2018 to present	Ongoing
Historical/Architectural Survey	January to February 2019	Complete
AM and FM Radio Report	February 2019	Complete
Off-Air TV Analysis	February 2019	Complete

Study	Date	Status[a]
Microwave Study	May 2017	Complete
Obstruction Analysis & Airspace Analysis	January 2019	Complete
Sound Study	February 2019	Complete
Shadow Flicker Analysis	February 2019	Complete
Jobs and Economic Development Impact (JEDI) Model	February 2019	Complete

(a) Although these studies are listed as "Ongoing," applicable resource and field survey data from these efforts have been incorporated into the impact conclusions provided in this Application, unless otherwise noted in the respective resource sections.

As shown in Table 2-2, Year 2 of the Baseline Avian Studies are ongoing. The studies will continue through April 2019 (see Section 13.2 for additional discussion).

Also, as shown in in Table 2-2, the cultural resources survey is ongoing. In coordination with the State Historic Preservation Office (SHPO), Level III intensive cultural resource surveys were conducted in October 2018 assuming a cultural resources Area of Potential Effects (APE) based on an initial Project layout. Based on the results of the October field survey, certain wind turbines, access roads, underground collection, Gen-Tie Line structure(s), and crane path(s) were modified to avoid these resources, which changed the cultural resources APE. Additional surveys need to be completed to evaluate portions of the current APE that were not surveyed in October. Approximately 32 percent of the current APE remains to be surveyed. These surveys will occur when sufficient snow melt allows for appropriate ground surface visibility, in coordination with the SHPO (see Section 20.5 for additional discussion).

2.6 Project Design

The results of the various coordination activities and studies listed above, along with applicable setback requirements, have been used to inform the site layout and design of the Project. Final micro-siting of Project facilities will continue to occur between now and summer 2019, based on the Phase I Environmental Site Assessment; remaining wetland and waterbodies evaluations, cultural and tribal resource surveys, and geotechnical analysis; and final engineering design. As discussed in more detail in the sections that follow, the remaining study work is not anticipated to affect the environmental analysis set forth in this Application for Facility Permit (Application), nor would it prevent the Project from meeting all applicable local, State, and federal permitting requirements.

3.0 FACILITY PERMIT APPLICATION

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

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

3.1 Relationship to NEPA

As discussed previously, since WAPA's execution of an interconnection agreement with the Project constitutes a federal action, WAPA is preparing an EA for the Project interconnection in accordance with applicable NEPA requirements.

The EA will tier off the analysis conducted in the *Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement* (UGP PEIS), prepared jointly by WAPA and the USFWS (WAPA and USFWS, 2015). The UGP PEIS assesses environmental impacts associated with wind energy development and identifies best management practices (BMPs) and avoidance and mitigation measures to address impacts. The EA is currently being prepared, and Sweetland anticipates that WAPA will approve a final EA and issue a Finding of No Significant Impact (FONSI) in the summer of 2019. While WAPA must analyze impacts of the entire Project, WAPA's federal action is limited to the approval of the interconnection.

3.2 Summary of Potential Impacts

Based on the analysis completed by Sweetland, the Project is not expected to have significant impacts on the environment. Approximately 75.3 acres of permanent disturbance is expected during the life of the Project. This represents approximately 0.4 percent of the total acreage within the Project Area, and disturbances would be dispersed throughout the Project Area.

Impacts to wetlands and streams have been minimized. Project components, such as wind turbines, Gen-Tie Line structures, and access roads, are generally located in upland areas, avoiding low-lying wetlands and streams. Permanent impacts to wetlands and streams are anticipated to be less than 0.10 acre. Accordingly, impacts to jurisdictional wetlands and streams are anticipated to be minor and to be authorized under U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) 12, without a pre-construction notification (PCN). In accordance with the conditions of NWP 12, wetlands and streams with temporary impacts would be restored to pre-construction conditions. Any revisions to the layout would likewise be required to comply with the conditions of NWP 12 or other applicable Clean Water Act (CWA) Section 404 requirements.

Most land proposed to be directly affected by Project construction is agricultural land. Siting of Project infrastructure has been implemented to maximize placement in areas previously disturbed by agricultural activities. Construction of Project facilities in cropland or grassland would have localized and/or temporary effects on terrestrial ecosystems. BMPs would be utilized to avoid or reduce impacts to the vegetation and water resources within the Project Area during construction. The Project's wind turbines and access roads avoid USFWS Grassland or Wetland Easements.

Studies following the USFWS *Land-Based Wind Energy Guidelines* (WEG) Tiers 1-3 and agency coordination with USFWS and South Dakota Game, Fish and Parks (SDGFP) have been conducted to assess the potential risk of impacts to threatened or endangered species and determine appropriate avoidance and minimization measures to further reduce potential impacts to protected species (see Section 13.2).

Existing land uses are not anticipated to be significantly changed or impacted by the Project. Sound from the Project construction activities would be temporary. Once the Project is operational, sound from the turbines would comply with the Project's Development Agreement with Hand County (see Section 15.3). Shadow flicker from operation of the turbines also would comply with the Project's Development Agreement with Hand County (see Section 15.5).

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

Construction activities for this Project would be short-term, and no negative impact to the socioeconomics of the area is expected. Project construction and operation are anticipated to provide economic benefits to local businesses and landowners in the region.

A cultural resource Level I records review identified previously recorded archaeological and historic resources located within or near the Project Area. Level III intensive cultural resource surveys were conducted in October 2018 in coordination with the SHPO. Additional surveys will be completed when sufficient snow melt allows for appropriate ground surface visibility, in coordination with the SHPO (see Section 20.5 for additional discussion). In addition, the Applicant has engaged in ongoing coordination with interested tribes (see Section 20.5.2 for additional discussion). The Applicant will work cooperatively with the SHPO to avoid impacts to National Register of Historic Places (NRHP) eligible or listed cultural resources and will coordinate with the tribes to avoid identified traditional cultural properties (TCPs).

Additional avoidance and minimization measures proposed for the Project include the following:

- Wind turbines will be illuminated in accordance with Federal Aviation Administration (FAA) regulations and will employ an Aircraft Detection Lighting System (ADLS), if required;
- Existing roads will be used for construction and maintenance, where possible;
- Access roads created for the Project will be located to limit cuts and fills;
- Temporarily disturbed uncultivated areas will be reseeded with either Natural Resources Conservation Service (NRCS) recommended seed mixture and/or a seed mixture specifically requested by the landowner;
- BMPs to be implemented in accordance with the Storm Water Pollution Prevention Plan (SWPPP) will be used during construction to control erosion and avoid or reduce impacts to drainage ways and streams from sediment-laden runoff from exposed soils;
- The Applicant will avoid the placement of wind turbines and access roads on land held for conservation purposes via USFWS Wetland and Grassland Easements. Temporary impacts to USFWS Grassland Easements will include the installation of underground collection lines.
- The Applicant will avoid placement of Gen-Tie Line structures on USFWS Wetland Easements and will minimize placement of Gen-Tie Line structures on USFWS Grassland Easements.
- The Applicant will minimize impacts to previously undisturbed grasslands (see Section 13.1);
- The Applicant will comply with applicable setbacks, conditions, and siting standards required by the Hand County Development Agreement (December 4, 2018) and State governing bodies;
- The Project will limit expected shadow flicker to 30 hours per year or less at occupied residences, unless waived in writing by the owner of the occupied residence.

- Sound levels from Project wind turbines will not exceed 50 dBA at the currently occupied residences of participating landowners and 45 dBA at the currently occupied residences of non-participating landowners, unless waived in writing by the owner of the occupied residence.
- The Applicant will have a tribal monitor present during Project construction.

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

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

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

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

ARSD 20:10:22:06. Names of participants required. *The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.*

The Applicants' full names, business address, and business telephone number are:

Matt Heck, Director of Development
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Individuals who are authorized to receive communications relating to the Application on behalf of the Applicant include:

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

ARSD 20:10:22:07. Name of owner and manager. *The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.*

Sweetland will construct, own, and operate the Project. Sweetland currently holds the land rights and interconnection requests necessary to facilitate development of the Project as proposed. Michael Rucker is the Managing Member of Sweetland, which is a wholly-owned subsidiary of Scout Clean Energy. Mark Wengierski, Project Manager, is managing development of the Project.

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

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

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

Electricity generated by the Project would interconnect to the transmission grid via an up to 7-mile long, 230-kV Gen-Tie Line that would carry the electricity to a switchyard to be built adjacent to the existing Fort Thompson to Huron 230-kV transmission line.

The specific electricity generated by the Project would be utilized as needed on the Southwest Power Pool (SPP) regional grid and cannot be tracked to its exact delivery location or final use. The electricity generated by the Project would help SPP operators meet electricity demand in both the immediate and surrounding SPP control areas. This Project would also provide zero-emission electricity to the grid, as well as firm price stability due to the availability of a renewable resource that would reduce the need for ongoing fuel costs. Demand for this power and the benefits it provides are discussed in Section 6.1.

Additionally, the Project would provide a variety of local benefits. During construction, a 200-MW wind project, such as this Project, typically generates an immediate need for approximately 200 temporary construction jobs over approximately 12 months. Construction and operation of a typical 200-MW wind project results in the injection of millions of dollars into the local economy throughout the life of the Project. These investments would be seen throughout the community, including at hotels, restaurants, gas stations, auto repair companies, tire companies, grocery stores, hardware stores, and other local businesses. During operation, the Project would employ approximately eight to ten full-time personnel as facility managers, site managers, and turbine technicians. Over the estimated 35-year life of the Project, the Project is expected to directly generate approximately $78.6 million in direct economic benefits for local landowners, new local employees, local communities, and the State of South Dakota.

6.1 Renewable Power Demand

The electric power sector is the largest consumer of primary energy in the United States (U.S. Energy Information Administration [EIA], 2017a). In 2017, United States electricity customers consumed 3.7

billion MW-hours of energy (EIA, 2018a), and the EIA estimates that U.S. electricity consumption will grow by 5 percent from 2016 to 2040 (EIA, 2017b). Wind energy accounts for approximately 6.32 percent (90 GW) of U.S. electricity generation (U.S. Department of Energy [DOE], 2017a). According to the Pew Research Center, 83 percent of Americans support expanding wind development in the U.S. (Pew Research Center, 2016). Although South Dakota has one of the smallest populations of any state, due to its energy intensive industries (i.e., agriculture, manufacturing, and mining), hot summers, cold winters, and periodic droughts, South Dakota is one of the top ten states in total energy consumption per capita. South Dakota is also one of the top seven states in wind potential. Although it is already ranked second in the nation after Iowa in the amount of net electricity generation provided by wind (approximately 26 percent in 2016), South Dakota's potential is just beginning to be developed (EIA, 2017c). The DOE's WIND Exchange platform indicates that South Dakota has approximately 417,879 MW of total potential wind capacity; however, only 977 MW of wind energy generation has been installed as of the second quarter of 2017 (DOE, 2017b), which is less than 1 percent of its total potential capacity.

Demand for wind energy in the region continues to be strong, both from utilities as well as commercial and industrial customers. This is evident in regulatory filings from utilities and corporate sustainability commitments. The Project is needed to meet this industrial/commercial, electric utility, and consumer demand for renewable power.

The demand for renewable wind energy has increased because of its cost-competitiveness with traditional fuel sources, such as coal and natural gas. The Project would provide a new source of low-cost energy for South Dakota and the United States, helping the nation move towards the goal of energy independence while reducing pollution and carbon emissions. The cost of energy from wind has declined by nearly two-thirds over the past decade, while the average output has increased by more than one-third during that same period (Electricity Markets & Policy Group, 2018). According to Lazard, an international economics firm, wind energy in the interior/Great Plains region is the least costly source of new power generation, even without accounting for available federal tax incentives, which further reduce the cost to customers (Lazard, 2016). As costs have fallen and technology has improved, wind energy has proven to be both a cost-effective, reliable source of energy generation for utilities and a valuable hedge against volatile fossil fuel prices.

For example, Xcel Energy's most recent Integrated Resource Plan in Minnesota demonstrates that adding 1,800 MW of new wind energy generation over the next several years is both necessary and cost

effective.[2] Xcel Energy has also stated its intent to meet 85 percent of its customers' needs with carbon-free resources, including wind energy, by 2030. Otter Tail Power Company's most recent Integrated Resource Plan shows it will be adding 400 MW of wind in the near term.[3] Great River Energy, a large generation and transmission cooperative, recently committed to 50 percent renewable energy by 2030 (Great River Energy, 2018).

Beyond the growing demand from utilities, non-traditional power buyers, such as Google, IKEA, Apple, eBay, Facebook, General Motors, Johnson & Johnson, Kellogg's, Microsoft, Nike, and Wal-Mart, have announced plans to purchase renewable energy, such as wind power. In fact, over two-thirds of the Fortune 100 companies have sustainability or renewable energy procurement goals, and over 3,800 MW of renewable energy have been purchased by non-utilities as of August 2018 (Business Renewables Center, 2018; Advanced Energy Economy, 2018). That compares to 2,890 MW procured by non-utilities in 2017 and approximately 1,700 MW in 2016. These businesses have a rapidly growing appetite for affordable clean energy, and South Dakota wind is poised to help meet that demand.

Beyond the market for wind energy, the public has also shown support for the use of renewable energy. According to a Gallup national poll in March 2018, 73 percent of Americans are in favor of "emphasizing the development of alternative energy such as wind and solar power" compared to 21 percent in favor of emphasizing production of oil, gas, and coal (Gallup, Inc., 2018).

This support can also be seen in legislation throughout the nation. Twenty-nine states have adopted renewable portfolio standards (RPSs). These standards require utilities to sell a specified percentage or amount of electricity generated from renewable resources annually. An additional eight states, including South Dakota, and two territories have adopted renewable energy goals. The Project would provide a new source of low-cost energy for South Dakota and the United States, helping the nation move towards the goal of energy independence while reducing pollution and carbon emissions.

6.2 Wind Resources Areas

The Applicant retained the services of Natural Power to perform a Wind Energy Resource Assessment report for the Project Area. To obtain an accurate representation of the wind resources, Natural Power performed a comprehensive analysis using the following data:

[2] MN PUC Docket No. 15-21, MPUC Order; MN PUC Docket No. 16-777, MPUC Order; 2020-2034 Upper Midwest Resource Plan Informational Letter, MN PUC Docket No. E002/RP-15-21, June 8, 2018; https://www.xcelenergy.com/company/corporate_responsibility_report/library_of_briefs/climate_change_and_greenhouse_gas_emissions.
[3] MN PUC Docket No. 16-386, MPUC Order

- Onsite data collected at the Project's temporary meteorological towers;
- Long-term correlation from the National Aeronautics and Space Administration's (NASA) Modern Era Retrospective-Analysis for Research and Application (MERRA-2), and National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information Automated Surface Observing System (ASOS) units at Aberdeen and Mitchell Airports;
- Project Area topographic and land cover data;
- Potential turbine locations within the Project Area;
- Power curves from General Electric (GE) 2.82/127 turbine model with a hub height of 89 or 114 meters (290 or 374 feet);
- State and county standards and setbacks.

Data from onsite meteorological towers was collected in two main timeframes. Four 50-meter meteorological towers were originally installed in 2007 to document onsite winds, with a 60-meter tower added in November 2008. Measurements at these five towers ended in 2009, and the towers were removed. Two new 60-meter towers were installed in June 2017 to resume the measurement program, along with a new 100-meter tower in July 2017 and two new additional 60-meter towers in August 2018. These five towers are still on the Project site.

Based on data collected from August 2007 to May 2009 and July 2017 to August 2018, wind speeds at the Project Area are highest from October through January and lowest from June through August. For a hub height of 89 meters, composite mean annual wind speeds average between 8.5 and 9.7 meters per second (m/s) from September through May, and average between 7.7 and 7.9 m/s from June through August. For a hub height of 114 meters, composite mean wind speeds average between 8.9 and 10.2 m/s from September through May, and average between 8.1 and 8.3 m/s from June through August.

Hub-height wind speeds are highest during the overnight hours (9:00 P.M. to 5:00 A.M.) and lowest during the midday hours (10:00 A.M. to 4:00 P.M.), with decreasing wind speeds from the early morning to midday, and increasing wind speeds from midday to the evening. These are typical diurnal wind speed patterns observed in the upper Great Plains region, due to differences in heating and cooling of the atmosphere throughout the day.

Natural Power compared the onsite data to reference data near the Project: MERRA-2 data and the Aberdeen and Mitchell airport ASOS data. The analysis showed that daily r-squared values of the towers

average 0.68 to 0.85 to the reference stations. This correlation lends confidence to the assessment in that the site-specific data can accurately be placed in a long-term climatological context.

The Project is classified as an International Electrotechnical Commission (IEC) Classification Class II wind site. IEC Classifications are a set of design requirements that ensure wind turbines are engineered against damage from hazards within their planned lifetime. An IEC Class II wind site has an annual average wind speed at the hub height greater than 8.5 m/s and less than 10 m/s.

6.3 Consequences of Delay

If the Project is delayed, the Project's benefits would be reduced. The Project qualified at the end of 2016 to receive the full Production Tax Credit (PTC) for a 10-year period. However, if the Project does not achieve commercial operations by December 31, 2020, then the PTC amount received by the Project would be reduced by 20 percent for each year of delay. Additionally, if the Project were delayed, the Project's benefits to the local communities, such as employment, spending, and tax revenue, would be deferred.

7.0 ESTIMATED COST OF THE PROJECT (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 $240 million based on indicative construction and wind turbine pricing cost estimates for the proposed GE 2.82/127 turbine layout. This estimate includes lease acquisition; permitting, engineering, procurement, and construction of the Wind Farm, Gen-Tie Line, and associated facilities; and Project financing. Ongoing O&M costs and administrative costs for the Project are estimated to be approximately $8.0 million per year, including payments to landowners for easement rights.

These Project costs include the Gen-Tie Line, which carries approximately $3.9 million in capital costs and approximately $10,000 per year in O&M costs. The Gen-Tie Line costs also include payments to landowners for their transmission easements.

8.0 GENERAL SITE AND PROJECT COMPONENT DESCRIPTION (ARSD 20:10:22:11, 20:10:22:33:02, 20:10:22:34)

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.*

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.*

8.1 Site Location and Overview

The Project would be located on approximately 20,979 acres of land in Hand County, southeast of the City of Miller, in east-central South Dakota. The Project Area is located in Pearl, Hulbert, and Rose Hill Townships. Figure A-1 in Appendix A shows the locations of state, city, and township boundaries relative to the Project Area. Table 8-1 shows the townships, ranges, and sections that intersect the Project Area.

Table 8-1: Sections that Intersect the Project Area

Township Name	Township	Range	Sections
Rose Hill	110N	66W	3, 4, 5, 6, 7, 8, 9, 10, 11
Hulbert	111N	66W	5, 6, 7, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33
Pearl	111N	67W	1, 2, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 35

The Project Area is generally rural agricultural with low population density. Figure A-1 shows the major highways and roads that extend through the area. There are no active railroads or airports within or adjacent to the Project Area; the closest railroad is approximately 2 miles northeast of the Project Area, and the closest airport, Miller Municipal Airport, is approximately 6 miles northwest of the Project Area. Places of historical significance are discussed in Section 20.5 of this application. No cemeteries or public or institutional facilities are within or adjacent to the Project Area (Section 20.5). The Project Area is drained by East Pearl and Silver Creeks (Figure A-1), and includes small waterbodies. Figure A-9 in Appendix A shows the locations of water resources within the Project Area; see Section 12.2.

8.2 Wind Farm Facility

The Wind Farm would include up to 71 wind turbines with an aggregate nameplate capacity of approximately 200 MW. The Wind Farm would also include electric underground collection lines and

communication lines, a Project substation, a switchyard, an O&M facility, access roads connecting turbines and associated facilities, up to four permanent meteorological towers, and a temporary laydown yard. Figure A-2 shows the proposed layout of the Wind Farm facility. Table 8-2 lists the sections within the Project Area containing the proposed Wind Farm.

Table 8-2: Sections Containing Wind Farm Facilities

Township Name	Township	Range	Sections
Rose Hill	110N	66W	3, 4, 5, 6, 9, 10, 11
Hulbert	111N	66W	5, 6, 7, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33
Pearl	111N	67W	1, 2, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26

Figure A-2 shows the proposed 71 primary wind turbine locations, as well as the proposed 15 alternate turbine locations (see Section 9.2). The current turbine array was designed to avoid cultural and tribal resources identified during surveys conducted in October 2018. Because some turbine locations changed as a result of the October surveys, the defined cultural resources APE also changed, although it overlaps substantially with the original cultural resources APE. Cultural and tribal resources surveys were completed for approximately 68 percent of the current APE for cultural resources (see Section 20.5), but due to winter weather, the surveys have been delayed for the remaining 32 percent. The remaining surveys will be completed once there is sufficient snow melt to allow for adequate ground surface visibility onsite.

Additional minor shifts in the turbine locations may be necessary to avoid newly identified cultural and tribal resources or as a result of geotechnical evaluations, landowner input, or other factors. Therefore, the Applicant requests that the permit allow turbines to be shifted within 250 feet of the turbine locations identified in the Application without Commission approval, as long as the turbine shifts comply with county and State setback requirements and commitments, and specified noise and shadow flicker commitments; cultural and tribal resource impacts are avoided or mitigated in consultation with SHPO; and wetland impacts are avoided. Prior to implementing the turbine adjustment, the Applicant would file in the docket an affidavit demonstrating compliance with the limitations set forth above. Any turbine adjustment that does not comply with the aforementioned limitations would be considered a "material change," and the Applicant must file a request for approval of the "material change" prior to making the adjustment pursuant to the following approval process:

- Applicant would file with the Commission and serve on the official Service List a request for approval of the adjustment that includes:

- An affidavit describing the proposed turbine adjustment, the reason for the adjustment, the reason the adjustment would not comply with one or more turbine flexibility limitations set forth above, and information regarding compliance with all other applicable requirements.
- A map showing both the approved location and the proposed adjustment (in different colors).
- Once received, the information would be reviewed by Commission staff, and Commission staff would have 10 calendar days within which to request further Commission review.
- If no further review is requested, Applicant may proceed with the adjustment.
- If further review is requested, the Commission would issue a decision regarding Applicant's request at its next available regularly scheduled Commission meeting, subject to notice requirements, after the request for further review is made by Commission staff.

Figure A-2 also shows the proposed locations of access roads and underground collection and communication lines. As a result of final micro-siting and the utility coordination needed to facilitate Project interconnection, shifts in the access roads and underground collection/communication systems, as well as changes in the locations of the O&M facility, meteorological towers, Project substation, switchyard, and laydown yard, may be necessary. Therefore, the Applicant requests that the permit allow those facilities to be modified, as needed, so long as the new locations are on land leased for the Project; cultural and tribal resources are avoided or mitigated in coordination with SHPO; wetland impacts are avoided; and all other applicable regulations and requirements are met.

8.2.1 Turbines

The following sections describe the wind turbines in general, as well as the specific turbine options under consideration and the associated land disturbance acreage.

8.2.1.1 General Description

Each wind turbine consists of three major components: the tower, the nacelle, and the rotor. These components are mounted on a concrete foundation, also known as a turbine pad, to provide structural support to the assembled turbine.

The tubular towers proposed for the Project would be conical steel structures or a combination of steel and concrete depending on final turbine selection. Each tower has a lockable access door, internal lighting, and an internal ladder and lift to access the nacelle. In accordance with FAA regulations, the towers would be painted off-white to minimize visual impact.

The nacelle sits atop the tower. The main mechanical and electrical components of the wind turbine are housed in the nacelle. The nacelle is mounted on a sliding ring that allows it to rotate, or "yaw," into the wind to maximize energy capture. The nacelle components include the drive train, gearbox, generator, and generator step-up transformer. The nacelle is housed in a steel-reinforced fiberglass shell that protects internal machinery from the environment. The housing is designed to allow for adequate ventilation to cool internal machinery. It is externally equipped with an anemometer and a wind vane to measure wind speed and direction. The generated electricity is conducted through cables within the tower to a switch enclosure mounted at the base of the turbine tower. The FAA determines lighting specifications for the towers, and, if required, the Applicant would use an ADLS.

A rotor assembly is mounted on the drive shaft and operates upwind of the tower. The drive shaft is connected to the gearbox and generator contained within the nacelle. Electric motors within the rotor hub vary the pitch of each blade according to wind conditions to maximize turbine efficiency at varying wind speeds.

8.2.1.2 Turbine Type

Sweetland is considering using the GE 2.82/127 turbine model with a hub height of 89 or 114 meters (290 or 374 feet). Table 8-3 summarizes the turbine options under consideration. Figure A-3 is a representative diagram depicting the GE 2.82/127 turbine. Sweetland plans to select the most appropriate technology for the Project in terms of cost efficiency and optimization of wind and land resources.

Table 8-3: Turbine Options

Model Name	Current Nameplate Capacity (MW)	Hub Height (meters/feet)	Rotor Diameter (meters/feet)	Tip Height (meters/feet)	Swept Area (sq. meters / sq. feet)
GE 2.82/127	2.82	89/290	127/417	153/499	12,668/136,354
GE 2.82/127	2.82	114/374	127/417	178/584	12,668/136,354

The Project would construct up to 71 turbines in the array, selected from the proposed 71 primary and 15 alternate turbine locations. Setback distances are calculated using the hub height, rotor diameters, and tip heights shown in Table 8-3, and setbacks are measured from the center of the base of the turbine structure.

While the Applicant is currently planning to utilize the GE 2.82/127 turbine model, GE may adjust the turbine's megawatt output, with all other specifications remaining the same. In the event this occurs, the Applicant may utilize this newer GE turbine. The Applicant also requests the flexibility to select a

different turbine model than the GE turbine model currently under consideration. Regardless of the turbine model selected, the turbine locations would be chosen from the same 86 turbine locations, and the Project layout would comply with applicable County and State setback, sound, and shadow flicker requirements and commitments.

Although a maximum of 71 turbines would be installed for the Project, for the purposes of the analyses in this document, impact calculations are based on all potential 86 turbine locations (71 primary and 15 alternate). Construction of each turbine would disturb a 225-foot radius area. The permanent turbines and foundations would each impact a 50-foot radius area.

8.2.2 Access Roads and Crane Paths

Existing public roads, private roads, and field paths would be used to access the Wind Farm. The existing roads may require improvements before, during, or following construction. Where necessary, new access roads would be constructed between existing roadways and Wind Farm components. The permanent access roads would be all-weather, gravel surfaced, and generally 16 feet in width for the drivable area and additional width for the shoulder and drainage (if necessary). During construction, some of the access roads would have temporary widths generally not exceeding 50 feet.

The final access road design for all 86 turbines (71 primary turbines and 15 alternate turbines) would be dependent on geotechnical information obtained during the engineering phase and final turbine placement. For the purposes of this Application, the Applicant has conservatively assumed an access road network for all 86 turbines of approximately 24.5 miles of new private roads.

Separate access may be required for the cranes used to erect the wind turbines. In such cases, temporary 36-foot-wide crane paths would be constructed between turbine locations. Following completion of construction, the temporary crane paths would be removed (if required), and the area restored (as needed), in accordance with industry standards. For the purposes of calculating crane path impacts in this Application, the Applicant has conservatively assumed up to 19.7 miles of crane paths for all 86 turbines.

8.2.3 O&M Facility

An up to 4-acre O&M facility would be constructed within the Project Area at a location well-suited for access to the turbines, as well as the Project substation and switchyard. Two potential O&M facility locations, as shown on Figure A-2, are currently being evaluated. The northern location is preferred, but the southern location has also been identified as an alternate. As discussed in Section 9.2, the Applicant requests that the permit allow the O&M facility location to be modified, as needed, as long as the final location is on land leased for the Project; cultural resource impacts are avoided or mitigated in

coordination with SHPO; wetland impacts are avoided; and all other applicable regulations and requirements are met.

The facility would be comprised of a single- or two-story building, which would house operating personnel, offices, operations and communication equipment, parts storage and maintenance activities, and a vehicle parking area. An area for outdoor storage of larger equipment and materials would also be included within a fenced area for safety and security.

8.2.4 Meteorological Towers

Up to four permanent meteorological towers would be installed as part of the Wind Farm. These meteorological towers are used to obtain wind data for performance management once the Wind Farm is operational. The Applicant commits to siting the meteorological towers outside of USFWS Wetland and Grassland Easements and outside of high-quality grasslands (Excellent or Above Average grasslands, as described in Section 13.1). The Applicant requests that the permit allow the up to four meteorological tower locations to be located within the Project Area as needed, as long as the final locations are on land leased for the Project; cultural resources are avoided or mitigated in coordination with SHPO; wetland impacts are avoided; and all other applicable regulations and requirements are met.

The meteorological towers would be either free-standing or guyed, with heights not to exceed the hub height of the wind turbines. The permanent meteorological towers would be marked and lighted as specified by the FAA. The Applicant would use ADLS on the meteorological towers, if required by the FAA.

Construction of each meteorological tower would disturb a 150-foot radius area, and operation of each meteorological tower would result in a permanent impact of up to approximately 35 by 35 feet for the tower and 2 by 10 feet each for three guy anchors, if used, for a total of 1,285 square feet for each tower.

8.2.5 Project Electrical System

Each of the wind turbines would have a transformer either pad-mounted outside the tower at the base of the turbine, mounted in the nacelle, or mounted within the tower. The proposed turbines would be connected to the Project substation by 34.5-kV underground collection lines, including an occasional aboveground junction box. At the Project substation, the power would be converted from 34.5 to 230-kV and then transmitted via an aboveground 230-kV Gen-Tie Line to a new switchyard adjacent to WAPA's existing Fort Thompson to Huron 230-kV line, located within the southern portion of the Project Area.

8.2.5.1 Collection System

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

8.2.5.1.1 Underground Collection Lines

The underground collection lines would consist of an underground electrical cable system between the Project substation and the individual turbine locations. The underground collection lines would be designed for operation at 34.5 kV. The underground collection lines would be installed in a trench approximately 42 inches below the ground to avoid potential impact from the existing land uses. A fiber-optic cable and an additional separate ground wire would also be installed with the underground collection system. The fiber-optic cable would be used for telemetry, control, and communication purposes. Aboveground junction boxes would be installed as required for connections or splices, approximately every 8,000 feet.

Construction of the underground collection lines for all 86 turbines (71 primary and 15 alternate) would temporarily disturb a 30-foot-wide path for approximately 53.0 miles. The Applicant assumes that some of the construction disturbance for the underground collection system would be shared with construction disturbance for other Wind Farm facilities where these facilities overlap. The ground surface above the lines would be revegetated, but no trees would be permitted above the lines. For all 86 turbines, permanent ground disturbance impacts from the underground collection lines during the operational life of the Wind Farm would be approximately 5 by 5 feet for each of the approximately 35 aboveground junction boxes.

8.2.5.1.2 Underground Communication System

Safety and control mechanisms are included in the Wind Farm design. These mechanisms are generally monitored using a supervisory control and data acquisition (SCADA) system. Each turbine is connected to the SCADA system via fiber-optic cable, which allows the turbines to be monitored in real time by the O&M staff as well as remotely. The fiber-optic cable would be installed in the same trench as the underground collection lines. The SCADA system allows the Wind Farm to be remotely monitored, thus increasing Wind Farm oversight, as well as the performance and reliability of the turbines. Not only would the local O&M office have full control of the wind turbines, but a 24/7 remote operations facility would also have control of the individual turbines. These two teams coordinate to operate the wind turbines safely and efficiently.

A third mechanism for safety and control is the turbines themselves. Each turbine monitors the wind speed and direction to ensure its current position is most efficient to produce electricity. This data is also used for feathering the blades; applying the brakes in high wind speeds or if there is ice build-up on the blades; and to tell the turbine when the wind is strong enough to begin turning the generator and producing electricity at the "cut-in" wind speed.

8.2.5.2 Project Substation

During construction of the Project substation approximately 3 acres in disturbance may occur. Once operational, the Project substation would comprise a 2-acre site, be fenced, and would consist of one substation transformer, circuit breakers, switching devices, auxiliary equipment, a control enclosure (containing equipment for proper control, protection, monitoring, and communications), and associated equipment and facilities. The principal function of the Project substation is to increase the voltage from the underground collection system (34.5 kV) to the voltage of the Gen-Tie Line (230 kV). The fence would be designed in accordance with industry standards to provide safety and security. Approval for the Project substation would be subject to Hand County's Conditional Use Permit process.

8.2.5.3 Power Demands

The wind turbines would require power for operation. During calm wind periods, wind turbine power demand can include the yaw motor, control system, cold weather package, lighting, and hydraulic pump and amount to a maximum of 40 kilowatts for each turbine if all loads are operating at the same time. The power would be supplied by back-feed power from the point of interconnection with the existing Fort Thompson to Huron 230-kV transmission line (see Section 8.3). The Applicant would enter into service agreements with the transmission operator and the local electric cooperatives for station power energy. The Project substation back-up power and power for the O&M building would be supplied through local distribution systems.

8.2.6 Switchyard

The Project would have a switchyard constructed by WAPA (or constructed by Sweetland utilizing WAPA specifications in accordance with the Interconnection Agreement), which would serve as the electrical interconnection between the Project and the electrical grid. The switchyard would be constructed on 10 acres and operated on 8 acres in the Project Area adjacent to the existing Fort Thompson to Huron 230-kV transmission line (Figure A-2). Approval for the switchyard would be subject to Hand County's Conditional Use Permit process.

8.2.7 Construction and Operations

As stated in the prior subsection, the switchyard would be constructed by WAPA (or constructed by Sweetland utilizing WAPA specifications in accordance with the Interconnection Agreement). The following paragraphs describe construction and operation of the remaining Wind Farm facilities (turbines, access roads, O&M facility, meteorological towers, and project electrical system).

8.2.7.1 Construction

Once the Facility Permits are approved and other county, State, and federal approvals are obtained, the Applicant would complete engineering-scale design of the access roads, construction areas, turbine foundations, and the electrical components. Construction of the onsite roads, tower foundations, O&M facility, underground collection lines, and Project substation would take approximately 7 to 9 months. The installation of the turbines would take approximately 2 to 3 months. Temporary construction areas would be restored after construction, including removing gravel, decompaction of subsoil (if necessary), and replacing topsoil. Where necessary, temporary and permanent stabilization measures would be implemented, including mulching, seeding with appropriate seed mix, and installing slope breakers. The Applicant would work closely with affected landowners to maintain fences and protect livestock not only during construction activities, but throughout operation of the Project.

For road construction, topsoil would be removed and stockpiled in the temporary construction areas. If necessary for drainage and access, temporary culverts and field approaches would be installed.

For turbine foundation installation, topsoil and subsoil would be removed, separated, and stockpiled at each turbine site. After construction, the subsoil and topsoil would be restored over the temporary construction areas and the turbine pad foundation.

Underground collection lines would be installed by trenching or boring For trenching of underground collection lines, Sweetland personnel and its contractors would remove topsoil prior to trenching and restore topsoil after trenching is complete.

Construction activities, including the Gen-Tie Line, would be staged from a laydown yard. The laydown yard would be restored post-construction (Section 8.4). Tree-clearing activities for the Project would be minimized.

Sweetland personnel and its contractors would confer and coordinate closely with the South Dakota Department of Transportation (SDDOT), Hand County, and affected townships to manage construction traffic and safely deliver the various turbine components. As applicable, Highway Access and Utility

Permits would be obtained from the SDDOT prior to construction, and contractors would be required to obtain any necessary overheight or overweight haul permits. Prior to construction, the Applicant shall work with the County and townships on the applicable agreement, such as a Road Haul Agreement, to permit right-of-way occupancy, utility crossings, road approaches, and overweight loads.

8.2.7.2 Operations and Maintenance

The Wind Farm would be operated and maintained by a team of approximately eight to ten personnel, including facility managers, a site manager, and a certified crew of technicians. This team would be at the Project site or O&M facility during normal business hours and would perform routine checks, respond to issues, and optimize the performance of the Wind Farm. The team would also have specified personnel on-call 24 hours per day, 7 days per week, should an issue arise outside of normal business hours. The onsite team would work in coordination with offsite operations staff at a Remote Operation Control Center in accordance with Federal Energy Regulatory Commission guidelines. This offsite team would assist in identifying turbines operating at non-peak efficiency and helping onsite staff quickly locate turbines with potential operating issues so they could be quickly resolved to ensure safety and optimal performance of the Wind Farm. The onsite team would also conduct frequent visual assessments of the wind turbines to check for issues not impacting performance of the Wind Farm. A plan for addressing emergency incidents would be in place and is discussed in Section 20.3.

During operations, the O&M staff would perform scheduled, preventive maintenance on the turbines. This is typically done by personnel from the turbine manufacturer for the first 1 to 3 years. For the proposed GE turbine model, visual inspections and system checks would be performed annually and consist of lubrication, fluid checks, electrical inspections, and turbine functionality assessments. In addition, every 36 months, the torque requirements of the downtower assembly cabinet and downtower frame grounds, incoming power cables, and outgoing power cables would be checked. The onsite operations team also would drive throughout the Project on a regular basis conducting unrecorded visual inspections of the Project.

8.3 Transmission Facility

Two routes (preferred and alternate) for the up to 7-mile 230-kV Gen-Tie Line are under consideration. Both routes are discussed in the following subsections.

8.3.1 Transmission Right-of-Way

To transmit the power generated by the Project, the Gen-Tie Line would connect from the Project substation located in Section 18, Township 111N, Range 66W at the intersection of Vayland Road (a.k.a.,

369th Avenue, or Highway 9) and 205th Street in Hulbert Township, to the switchyard located in Section 9, Township 110N, Range 66W in Rose Hill Township. At the switchyard, the power would transfer to the existing Fort Thompson to Huron 230-kV transmission line, part of the SPP transmission line portfolio. Both the preferred and alternate routes would connect these same endpoints.

Sweetland has identified two potential routes for the Gen-Tie Line between the Project substation and the point of interconnection, both of which are wholly within the proposed Project Area for the wind energy facility. Figure A-2 illustrates the two route options for the Gen-Tie Line.

Sweetland's preferred route would extend south from the Project substation, through the sections identified in Table 8-4 and would avoid impacts to USFWS Wetland Easements and span Grassland Easements. However, a portion of the preferred route is not currently under easement, and while the landowners have authorized inclusion of their property in this Application, they would prefer to wait until after Energy Facility Permits have been issued by the Commission before deciding whether to participate in the Project. This landowner is shown as "pending participation" on Figure A-2.

Therefore, Sweetland has identified an alternate route located on land currently under easement so a fully secured right-of-way option is available to facilitate interconnection of the Project. This route parallels Vayland Road from the Project substation to 208th Street, continues west briefly, turns south past 209th Street, and then turns east into the switchyard. The route avoids placement of structures in USFWS Wetland Easements and minimizes surface disturbance to USFWS Grassland Easements by paralleling roads to the extent feasible.

Table 8-4 lists the sections within the Project Area for each of the Gen-Tie Line route alternatives.

Table 8-4: Sections Containing Permanent Transmission Facility Easement

Township Name	Township	Range	Sections
Preferred Route			
Hulbert	111N	66W	18, 19, 20, 29, 33
Rose Hill	110N	66W	4, 9
Alternate Route			
Hulbert	111N	66W	18, 19, 20, 29, 31, 32
Rose Hill	110N	66W	6, 7, 8, 9

Both routes would require a permanent right-of-way up to 150 feet wide, plus additional space outside the right-of-way at angle points for guys/anchors to secure the Gen-Tie Line. An additional 50 feet of

temporary construction workspace would be needed adjacent to the permanent right-of-way, for a total temporary construction easement width of 200 feet. The necessary land rights for both Gen-Tie Line routes were obtained or will be obtained through voluntarily executed Wind Leases or similar agreements, authorizing Sweetland to construct, maintain, and operate the Gen-Tie Line. The right-of-way would be entirely on private property and not within county and/or township rights-of way, except where they would cross public roads.

Temporary construction workspace would be reseeded and restored upon completion of construction. During operation, vegetation in the easement area would be maintained to avoid interference with the conductors, allow for ground-based inspections, and enable access to Gen-Tie Line structures when maintenance is required; however, prior agricultural land uses would be allowed to resume post-construction. Thus, other than periodic maintenance, permanent impacts would be limited to the footprint of the Gen-Tie Line structures contained within the 150-foot-wide right-of-way area. Restoration, operations, and maintenance are further discussed in Section 8.3.3.

8.3.2 Configuration of Pole and Conductors

The Gen-Tie Line design selected for the Project would be a single circuit transmission facility constructed on either (1) two-pole wooden H-frame structures, or (2) single steel monopole structures. The selected structure type would depend on cost due to the current uncertainty of steel prices due to tariffs. Figure A-4 in Appendix A provides diagrams of these two Gen-Tie Line structure options for the Project. Three-pole structures may be used at angles and dead ends.

Both the 2-pole wooden H-frame structures and single steel monopole structures for the Gen-Tie Line would be directly embedded in the ground. The H-frame structures would be buried in the ground to a depth of approximately 12 feet, and the structure height would be approximately 75 feet above grade. The H-frame structures would be spaced approximately 600 feet apart, and the conductor would be located approximately 30 feet above the ground. The single steel monopole structure would be buried in the ground to a depth of approximately 18 feet, and the structure height would be approximately 110 feet above grade. The single steel monopole structures would be spaced approximately 600 feet apart, and the conductor would be located approximately 30 feet above the ground. Guy wires would secure turning structures (angles) and dead-ends for safety. Sweetland would use 795 Aluminum Conductor Steel Reinforced (ACSR) Drake reinforced conductors or conductors of comparable capacity. Fiber optic cable would run the full length of the Gen-Tie Line for communications. Construction of each transmission structure would disturb an approximately 150- by 150-foot area, which would be contained within the gen-tie right-of-way area.

8.3.3 Construction and Operations

The following sections describe site preparation, construction, restoration, operations, and maintenance activities for the Gen-Tie Line.

8.3.3.1 Mobilization, Site Preparation, and Clearing

Once the applicable federal, State and local approvals have been obtained, soil conditions are established, and final design is completed, construction of the Gen-Tie Line would begin. Precise timing of construction would consider various requirements that may be in place due to permit conditions, system loading issues, weather, and available workforce and materials.

The Gen-Tie Line has been routed to minimize tree clearing. Isolated trees may need to be cleared to allow safe operation of the Gen-Tie Line. Surveyors would stake the construction right-of-way within the approved construction workspace and the pole locations of the approved alignment in preparation for the construction crew arriving onsite. Once the construction crew arrives, they would begin by clearing and grubbing out the workspace so vegetation meets standards and the construction crew would have easy access to the construction site. The crew would use chain saws, lifts, tractors, and bulldozers only where needed to clear vegetation. The crew would install temporary culverts and field approaches where needed to access the route and to maintain adequate access and drainage throughout construction. Sweetland would work closely with affected landowners to verify their fences are maintained and livestock is protected not only during construction activities, but throughout operations.

Silt fence and other erosion control measures would be installed in accordance with the Project's SWPPP and applicable permit conditions, and sensitive areas would be marked for avoidance. Appropriate safety measures would be implemented before pole foundation excavation begins, including notification through the One-Call system to verify third-party utilities and adjacent pipelines are properly marked. Equipment and vehicles would be transported to the Project Area and staged at the temporary laydown yard. During construction activities, dust control measures would be conducted in accordance with Hand County's Road Haul Agreement. In addition, safety would be a top priority during all aspects of construction activities, especially on public roads.

Sweetland has conducted pre-construction natural community surveys, which included observations of noxious and invasive weeds (see Section 13.1.1.2). A Noxious and Invasive Weed Management Plan would be developed to identify and establish the procedures to limit the introduction and spread of noxious and invasive weeds during construction and ongoing operations.

Potable water and sanitary facilities would be established to support the construction crews at the construction site. Potable water would be provided from offsite facilities, and sanitary facilities would be provided in the form of portable latrines by an outside vendor.

8.3.3.2 Transmission Facility Construction Procedures

Transmission facility structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope would not be graded or leveled. Sites with more than 10 percent slope would have working areas graded level or fill brought in for working pads. Sweetland anticipates that only minimal grading would be needed because both routes (preferred and alternate) have very little elevation change. Where grading is required, the topsoil would be removed and stored for replacement after construction is complete. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities. If permission is not obtained, the site would be graded back to as close to its original condition as possible; all imported fill, including temporary culverts and road approaches, would be removed from the site; and disturbed areas would be returned to pre-disturbance conditions.

The laydown yard and staging area required for construction of the Gen-Tie Line would be partially shared with the associated Wind Farm. Staging would involve delivering the equipment and materials to construct the new Gen-Tie Line. Structures would be delivered to staging areas, sorted, and loaded onto structure trailers for delivery to the staked location. The materials would be stored until they are needed for construction of the Gen-Tie Line. Sufficient rights to use the temporary laydown yard, outside of the Gen-Tie Line right-of-way, would be obtained from affected landowners through the existing wind leases or separate agreements.

When it is time to install the poles, structures would be moved from the staging areas, delivered to the staked location, and placed within the right-of-way. The structures for the Gen-Tie Line would be directly embedded and either backfilled with crushed rock or native soils.

Typically, access to a gen-tie line right-of-way would be made directly from existing roads or two tracks that run parallel or perpendicular to the easement. Primary access would be from Vayland Road (a.k.a., 369th Avenue, or Highway 9) and 208th Street. In cases where construction traffic and activities are within proximity to local, county, or State roadways, the contractor would coordinate with the governing body on traffic control and safety measures. In some situations, private field roads would be used. Permission from the property owner would be obtained prior to accessing the Gen-Tie Line right-of-way outside of public rights-of-way. Where necessary to accommodate the heavy equipment used in

construction (such as cranes, concrete cement trucks, and hole-drilling equipment), existing access roads would be upgraded, or new roads would be constructed. Once construction is complete, the temporary field approaches and access roads installed for the Gen-Tie Line easement would be removed and revegetated. The construction workspace would be reseeded or allowed to regenerate naturally so long as it does not encroach on typical utility best practice prescribed clearances. No permanent access roads would be maintained for the Gen-Tie Line.

8.3.3.3 Restoration Procedures

The construction workspace would be disturbed during the normal course of work (as is typical of most construction projects), which can take several weeks in any one location. Sweetland would take the steps necessary 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. After construction is completed, disturbed areas would be restored to their original condition. As mentioned previously, Sweetland would develop a Noxious and Invasive Weed Management Plan to limit the spread of noxious and invasive weeds during construction and ongoing operations.

Sweetland or its contractor would contact each property owner after construction is completed to identify and address any damage that may have occurred as a result of the construction of the Gen-Tie Line. If damage were to occur to crops, fences, or the property, Sweetland would repair or fairly compensate the landowner for the damages sustained in accordance with the terms and conditions agreed upon in the Wind Lease or other agreement entered into by Sweetland and the landowner.

In some cases, Sweetland may engage an outside contractor to restore the damaged property.

Portions of permanent vegetation disturbed or removed during construction of the Gen-Tie Line would be re-established to pre-disturbance conditions. Resilient species of common grasses and shrubs typically re-establish naturally with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the route would require assistance in re-establishing vegetation and controlling soil erosion. Commonly used BMPs to control soil erosion and assist in re-establishing vegetation include, but are not limited to:

- Erosion control blankets with embedded seeds;
- Silt fences;
- Hay bales;
- Hydro seeding, and;
- Planting individual seeds or seedlings of non-invasive native species.

8.3.3.4 Operations and Maintenance

Transmission facilities are designed to operate for decades. Typically, they require only minimal maintenance, particularly in the first few years of operation. The estimated service life of the proposed Gen-Tie Line is approximately 40 years.

The principal O&M cost for transmission facilities is the cost of inspections, which would be performed semi-annually by either truck, utility terrain vehicle, on foot, or by air. Inspections would be conducted to verify that the Gen-Tie Line is fully functional and that no vegetation has encroached so as to violate good utility best practice prescribed clearances. Sweetland would prune or remove vegetation as required to avoid physical contact between the Gen-Tie Line and nearby vegetation that could cause the Gen-Tie Line to fail. Annual operating and maintenance costs for 230-kV transmission facilities in South Dakota and the surrounding states are expected to be approximately $10,000. Actual line-specific maintenance costs will depend on the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

8.4 Temporary Laydown Yard

Two potential locations (a north location and a south location) are proposed for an up to 20-acre temporary laydown yard (Figure A-2). The northern location is preferred, but the southern location has also been identified as an alternate. The factors that would influence the final decision would be transportation logistics and construction input. The laydown yard would be used for construction of the Wind Farm. The same laydown yard may also be used for construction of the Gen-Tie Line. The up to 20-acre laydown yard would be restored once construction is complete, except for a portion retained for the O&M facility.

As discussed in Section 9.2, the Applicant requests that the permit allow the laydown yard location to be modified, as needed, as long as the final location is on land leased for the Project; cultural resource impacts are avoided or mitigated in consultation with SHPO; wetland impacts are avoided; and all other applicable regulations and requirements are met.

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

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

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

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

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

The following sections discuss the Project site selection process, including the alternatives considered, and summarize the siting criteria applied.

9.1 General Project Location Selection

In 2005, Clipper began signing wind leases with landowners in Hand County for what was then called the Rolling Thunder Wind Farm. Clipper's leasing efforts culminated in an approximately 500,000-acre wind farm area before the formation of a Joint Venture (JV) with BP Alternative Energy (BP). Upon formation of the JV, the project was renamed the Titan Wind Farm. BP built the first phase of the Titan Wind Farm in 2009 on approximately 8,000 acres in Hand County, utilizing ten Clipper Liberty wind turbines, with the power being sold to Northwestern Energy. Due to transmission constraints, market forces, and economic factors, BP did not construct any additional phases of the Titan Wind Farm in Hand County. BP subsequently exited the wind farm development business in 2013. With the exception of the leases tied to the initial phase of the Titan Wind Farm, leases held by Clipper/BP expired.

Sweetland met with the USFWS late in 2016 to discuss the historical 500,000-acre Titan Wind Farm (a.k.a., Rolling Thunder) site and to solicit feedback as to where the agency would recommend siting a project within the site. USFWS suggested a site in the southeasterly area of Hand County for a number of reasons, including minimizing impacts to USFWS Wetland and Grassland Easements, siting away from the Missouri River, minimal historic sage grouse lek locations, low historic avian and bat use, and a compatible land use (i.e., farming and ranching). Based on wind resources data, USFWS recommendations, and initial site analysis, the current approximately 20,979-acre Project site was identified within the original Titan Wind Farm site. The current Project site is located Pearl, Hulbert and Rose Hill Townships in Hand County. The site has a number of positive attributes, including:

- Strong support from the local landowners within the Project Area, resulting in the Applicant securing sufficient voluntary Wind Leases for development of the Project on private property.

The proposed Project has also received strong support from the Hand County Commission and other local stakeholders (for example, local business owners as well as Hand County Economic Development).

- A quality wind source, which is key for development of a competitive, economically viable wind project.
- Access to the transmission grid via the Fort Thompson to Huron 230-kV transmission line, which bisects the southern portion of the Project Area.
- Compatibility with the existing land uses, which are primarily agricultural (e.g., crop production, pasture land, hay production). Wind development is particularly compatible with agricultural land because the existing uses can continue around the wind energy facility. As a result, wind development allows landowners to diversify their operations with minimal disruption to existing agricultural uses.

Through preliminary desktop analysis, site-specific field studies, and ongoing coordination with agencies, such as the USFWS, SDGFP, and SHPO, Project facilities within this site were located to avoid or minimize potential adverse impacts to wetlands, grasslands, wildlife species of concern, and cultural resources, among other resources.

With respect to the Gen-Tie Line, the route alternatives identified were selected to enable interconnection of the Wind Project to WAPA's Fort Thompson to Huron 230-kV transmission line. The proposed routes were selected to minimize overall line length (only up to 7 miles long), while avoiding impacts to existing residences, cultural resources, wetlands, and USFWS Wetland Easements, and minimizing or spanning/avoiding (depending on the route option) impacts to USFWS Grassland Easements.

9.2 Site Configuration Alternatives

The 86 turbine locations proposed reflect an optimal configuration to capture wind energy within the Project Area, while avoiding impacts to residences, known cultural resources, wetlands, USFWS Wetland and Grassland Easements, and high-quality grasslands (reference Section 13.1). As discussed in Section 8.2, final micro-siting could result in minor turbine adjustments. However, the final Project layout would comply with the Hand County Development Agreement (Appendix C) and other applicable local, State, and federal requirements. To comply with applicable setbacks, a total of 64 primary and 9 alternate wind turbines are proposed to have a hub height of 114 meters, and a total of 7 primary and 6 alternate wind turbines are proposed to have a hub height of 89 meters. The Project layout would remain on land leased for the Project. Project layout would also comply with GE general setback considerations for wind turbine

siting (Appendix D). A summary of State and county setback and other siting requirements is provided in Table 9-1.

Table 9-1: Sweetland Wind Farm Siting Requirements/Commitments

Category	Requirements/Commitments
State Requirements	
Setbacks	Turbines shall be set back at least 500 feet or 1.1 times the height of the tower, whichever is greater, from any surrounding property line, unless the owner of the wind turbine tower has a written agreement with an adjacent land owner allowing the placement of the tower closer to the property line (SDCL 43-13-24).
Hand County Development Agreement	
Setbacks	Project wind turbines shall be set back 1,320 feet from currently occupied residence, unless waived in writing by the owner of the occupied residence
	Project wind turbines shall be set back from maintained County roadway, unless waived in writing by the County, by 1.1 times the wind turbine tip height
	Project wind turbines shall be set back from maintained township roadway, unless waived in writing by the applicable township, by 1.1 times the wind turbine tip height
	Project wind turbines shall be set back from existing overhead distribution and transmission lines, unless waived in writing by the infrastructure owner, by 1.1 times the wind turbine tip height
	Pursuant to SDCL 43-13-24, Project wind turbines shall be set back from property lines 500 feet or 1.1 times the height of the wind turbine tower, whichever is greater, unless the Developer has a written agreement with the adjacent landowner allowing the placement of the tower closer to the property line, in which case, the tower may be placed closer to the property line shared with that adjacent land owner.
Noise	Sound levels resulting from Project wind turbines will not exceed 50 dBA at the currently occupied residences of participating landowners and 45 dBA at the currently occupied residences of non-participating landowners, unless waived in writing by the owner of the occupied residence.
Shadow Flicker	Limit shadow flicker resulting from Project wind turbines at currently occupied residences to 30 hours per year or less, unless waived in writing by the owner of the occupied residence.

Source: Hand County Development Agreement, 2018

Setback distances are calculated using the maximum potential rotor diameter of 127 meters (417 feet) and hub heights of 89 or 114 meters (292 or 374 feet). The turbine locations would avoid wetland impacts, and cultural resource impacts would be avoided or mitigated in consultation with SHPO. The buildable area for turbines, after considering the setbacks in Table 9-1 are visually depicted on the siting constraints map provided as Figure A-5.

Two potential Gen-Tie Line route options are considered (preferred and alternate). For either of the two route options, the Applicant requests the ability to adjust structures as long as they remain within the 150-foot-wide right-of-way identified in the Application, and as long as impacts to cultural resources, sensitive habitat, and wetlands are avoided. Any adjustments that fall outside of the 150-foot-wide right-of-way identified in this Application, or do not meet the above-stated limitations, would be considered a "material change." If there were a "material change" the Applicant would follow the same process for review of the proposed "material change" as is outlined in Section 8.2 for turbine adjustments.

9.3 Lack of Reliance on Eminent Domain Powers

Sweetland would not use eminent domain powers to acquire easements for the Wind Farm or Gen-Tie Line. Thus, selection of an alternative site would not reduce reliance on eminent domain powers. All private land rights required for the Project were or would be obtained through voluntary agreements with property owners. Sweetland would obtain necessary road permits from road authorities prior to construction, and would coordinate with federal, State, and local agencies to obtain appropriate permits for the Project.

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

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

Chapters 11.0 through 15.0 and Chapters 17.0, 18.0, and 20.0 provide a description of the existing environment at the time of the Application submittal, the potential changes to the existing environment from Project construction and operation, and the irreversible changes anticipated to remain beyond the operational lifetime of the facility. These chapters also identify the avoidance, minimization, and mitigation measures that would be implemented for the Project.

Table 10-1 identifies the ground disturbance impacts (both temporary impacts during construction and long-term operational impacts) assumed for the Project.

Although the Project would involve the construction of a maximum of 71 turbine locations, for the purposes of this application, the ground disturbance impacts were calculated based on:

- All 86 turbine locations (71 primary and 15 alternate);
- All associated facilities (access roads, collection lines, etc.) for all 86 turbine locations;
- Up to four permanent meteorological towers
- One O&M facility, laydown yard, Project substation, switchyard; and
- One up to 7-mile gen-tie line and associated facilities (access roads, pull sites, etc.).

Because the approximately 200-MW Project would have a maximum of 71 wind turbines, the impact calculations overstate actual Project impacts.

Table 10-1: Summary of Sweetland Wind Farm Ground Disturbance

Project Component	Assumptions for Impact Analysis	Typical Construction Impacts (Temporary)		Operational Impacts (Long-Term)	
		Dimensions	Total Acreage	Dimensions	Total Acreage
Wind Farm					
Turbines	86 potential sites	225-foot radius	275.1 acres[a]	50-foot radius	15.0 acres[a]
Access roads for Wind Farm	24.5 miles, which covers all 86 potential turbine sites	50 feet wide	131.3 acres[a]	16 feet wide (plus revegetated shoulders and drainage)	46.2 acres[a]
Crane paths	27.6 miles, which covers all 86 potential turbine sites	36 feet wide	106.2 acres[a]	Will be restored post-construction if not located within road improvements	
Underground collection lines	53.0 miles, which covers all 86 potential turbine sites	30 feet wide	161.4 acres[a]	5- by 5-foot junction boxes; no trees on the ground surface above the lines	0.02 acre
Project substation	One substation location	3 acres	3 acres	2 acres	2 acres
Meteorological towers	Four meteorological towers (with guy wires)	150-foot radius	6.5 acres	1,285 square feet (35- by 35-feet for the tower plus 2- by 10- feet each for three guy wires)	0.1 acre
O&M facility	One O&M facility	4 acres	4 acres	4 acres	4 acres
Temporary laydown yard	One laydown yard	20 acres	20 acres	Will be restored post-construction and returned to pre-construction land use	
Switchyard	One switchyard	10 acres	10 acres	8 acres	8 acres
Subtotal Wind Farm		--	*717.5 acres*	--	*75.3 acres*
Transmission Facility					
Gen-tie line easement	Analysis assumes an up to 7-mile-long route	200 feet wide	161.0 acres[a]	150-foot wide easement, but will be restored post-construction	

Project Component	Assumptions for Impact Analysis	Typical Construction Impacts (Temporary)		Operational Impacts (Long-Term)	
		Dimensions	Total Acreage	Dimensions	Total Acreage
Structures footprint	Analysis assumes structures every 600 feet and up to 2 poles each structure	150 by 150 feet	Within Gen-Tie Line easement	28-inch diameter poles	0.01 acre
Access roads for Gen-Tie Line	Analysis assumes up to 1.6 miles of access roads	50 feet wide	9.7 acres[a]	Will be restored post-construction and returned to pre-construction land use	
Pull sites	Analysis assumes up to 12 pull sites	Varies	6.2 acres[a]	Will be restored post-construction and returned to pre-construction land use	
Subtotal Transmission Facility		--	*176.9 acres*	--	*0.01 acre*
	Project Total (Construction)		**894.4 acres**	**Project Total (Operation)**	**75.3 acres**

(a) Where facilities are collocated, land disturbance acreage is calculated for each facility's proportional disturbance.

A cumulative impacts analysis that accounts for the impacts of the proposed Project and other energy conversion facilities that are operating or under construction is required (ARSD 20:10:22:13). The phrase "energy conversion facility" is defined as "any new facility, or facility expansion, designed for or capable of generation of one hundred megawatts or more of electricity, but does not include any wind energy facilities (SDCL 49-41b-2(6))." There are no other operating energy conversion facilities, existing or under construction, or other major industrial facilities under regulation by the Commission within or adjacent to the Project Area. The 25-MW Titan Wind Project, located approximately 11.5 miles from the Sweetland Project, is the only other wind facility in Hand County. The next closest wind energy conversion facilities are the Wessington Springs Wind Project in Jerauld County located 22.5 miles southeast of the Project and the PrairieWinds Wind Project in Jerauld, Aurora and Brule counties, located 27.0 miles south of the Project. Given the lack of energy conversion facilities in the vicinity of the Project, and the distance of existing wind energy facilities from the Project, construction and operation of the Project would not result in cumulative effects on resources, as addressed in ARSD 20:10:22:13.

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

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

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

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

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

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

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

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

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

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

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

11.1 Geological Resources

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

11.1.1 Existing Geological Resources

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

11.1.1.1 Regional Landforms/Surficial Geology

The topography within the Project Area is generally characterized by gently rolling hills. Relief within the Project Area is low, with site elevations ranging from approximately 1,570 to 1,875 feet above mean sea level (AMSL). Within the Project Area, streams and drainages bisect the terrain. Figure A-6 is a topographic map of the Project Area.

The Project Area is located within the Missouri Plateau province of the Great Plains physiographic region. The Great Plains physiographic region is characterized by flat lands and geomorphic remnants of glaciation (National Park Service [NPS], 2017a). The Coteau du Missouri, a division of the Missouri

Plateau within the Project Area, is a highland area covered with glacial deposits underlain by Pierre shale and older formations (Northern State University, 2018). Positions of former stream valleys of the eastern continuations of the Grand, Moreau, Cheyenne, Bad, and White Rivers are marked by several broad sags which traverse the Coteau (Flint, 1955). There is currently no major stream that drains the Coteau du Missouri today.

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

- Qltg - Till, ground moraine (Upper Wisconsin): Compact, silty, clay-rich matric with sand- to boulder-sized clasts of glacial origin. A geomorphic feature characterized by smooth, rolling terrain. 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. Composite thickness of all Upper Wisconsin till may be up to 300 feet (91 meters).

Figure A-7a illustrates the surficial geology within the Project Area, and Figure A-7b is a geologic cross-section of the Project Area.

11.1.1.2 Bedrock Geology

The uppermost bedrock unit underlying the entire Project Area is the Pierre Shale (Figure A-7c). The Pierre Shale is an Upper Cretaceous-aged blue-gray to dark-gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, and light-brown chalky shale (SDGS, 2004b). The Pierre Shale contains minor sandstone, conglomerate, and abundant carbonate and ferruginous concretions, with thickness up to 1,000 feet (205 meters).

11.1.1.3 Economic Deposits

Commercially viable mineral deposits within Hand County are limited to sand, gravel, and construction aggregates. Information from the South Dakota Department of Environment and Natural Resources (SDDENR) Minerals and Mining Program and a review of the U.S. Geological Survey (USGS) 7.5-minute quadrangle mapping indicates there are no reclaimed or active construction aggregate sites located within the Project Area. There is 1 active quarry operated by Midland Contracting, Inc. located approximately 3 miles east of the Project Area (SDDENR, 2017a).

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

11.1.1.4 Seismic Risks

The risk of seismic activity near the Project Area is low. The USGS Earthquake Hazards Program estimates less than 1 percent chance of damage from earthquakes in 2018 (USGS, 2018a). Further, the 2014 USGS National Seismic Hazard Map indicates the peak ground acceleration (PGA) with a 2 percent chance of exceedance in 50 years is 0.06 to 0.01 peak acceleration, expressed as a fraction of standard gravity (g) (USGS, 2018a). According to the SDGS, a magnitude 4 earthquake was recorded in Hand County approximately 7 miles northwest from the Project Area once in 1899, followed by another in 1949 (SDGS, 2013). More recently, a magnitude 3.5 earthquake was recorded in Hand County in 1987, approximately 6 miles from the Project Area, and a magnitude 3 earthquake was recorded in Beadle County in 2003, approximately 9 miles from the Project Area. No other earthquakes have been recorded for Hand County from 1872 to 2019 (SDGS, 2013; USGS, 2019). Available geologic mapping and information from the USGS Earthquake Hazards Program do not indicate any active or inactive faults within the Project Area (USGS, 2018b).

11.1.1.5 Subsidence Potential

The risk for subsidence within the Project Area is considered negligible. The Pierre Shale bedrock is not known to exhibit karst topography or contain layers or members susceptible to dissolution by water. There is no evidence of any historic underground mining operations, which could lead to subsidence potential, existing within the Project Area.

11.1.2 Geological Resources Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to geological resources from development of the Wind Farm and Gen-Tie Line, and provides avoidance and mitigation measures, if applicable.

11.1.2.1 Wind Farm

The geological conditions, including geologic formations, seismic risk, and subsidence potential, within the area proposed for the Wind Farm facilities are favorable and are not anticipated to control or impact construction or operation of the Project. Excavation would be required to install the wind turbine foundations and trenching would be required to install underground collection lines. Prior to construction, geotechnical borings would be performed at all wind turbine locations to develop the specific design and

construction parameters. Laboratory testing of soil samples obtained from the site and geophysical surveys would be performed to determine the engineering characteristics of the site's subgrade soils. If necessary, modifications to roadway and foundation subgrade design would be made to account for specific site conditions. As discussed in Section 23.0, the facility would be decommissioned after the end of the Project's operating life. Wind turbines, underground collection lines, and the Gen-Tie Line would be removed in accordance with applicable State and County regulations, and turbine access roads would be removed unless otherwise agreed to by the landowner. After decommissioning of the Project is complete, the portions of underground facilities that have been abandoned in place would remain beyond the operational lifetime of the facility. However, these remaining facilities would not result in irreversible changes to the underlying geological conditions of the Project Area.

No quarries or developed oil and gas fields are within the Project Area. Thus, construction and operation of the proposed Wind Farm poses no impact to quarries or oil and gas resources, and no mitigation recommendations are required for impacts to these resources

11.1.2.2 Transmission Facility

Geological resources for the preferred and alternate Gen-Tie Lines are similar to those for the Wind Farm and not anticipated to control or impact construction of either Gen-Tie Line. Prior to construction, geological borings would be conducted every 6,500 feet for the Gen-Tie Line route (approximately up to 8 borings) to develop the specific design and construction parameters. Soil samples collected from borings would be tested to determine engineering characteristics of the site's subgrade soils, and modifications to roadway and foundation subgrade design would be made to account for specific site conditions. No quarries or developed oil and gas fields are within the Project Area. Construction and operation of either Gen-Tie Line would have no impact on quarries or oil and gas resources, and no mitigation recommendations are necessary for impacts to these resources.

11.2 Soil Resources

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

11.2.1 Existing Soil Resources

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

11.2.1.1 Soil Types

The soils within the Project Area primarily consist of fine or fine-loamy soils derived mostly from loamy till to fine-loamy till, and the underlying Pierre Shale bedrock. The soils in the Project Area are not highly susceptible to erosion and are generally conducive to crop production (NRCS, 2018a). Nearly all the soils within the Project Area have moderate to high potential to be corrosive to buried steel, and most of the soils within the Project Area have low to moderate potential to be corrosive to concrete. A majority of the soils in the Project Area are well drained, and only approximately 5 percent of the soils have a significant hydric component (defined as 62 to 100 percent of the soils are hydric). Approximately 4 percent of the soils are considered to have a high potential for frost action (NRCS, 2018a). Table 11-1 lists the soil types comprising more than 1 percent of the Project Area and the characteristics of these soils, and Figure A-8 illustrates the soil types and distributions within the Project Area.

11.2.1.2 Erosion Potential and Slopes

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of Ksat range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The soils in the Project Area are moderately susceptible to erosion and have Ksat factors ranging from 0.20 to 0.43, with the majority between 0.24 and 0.28. Slopes in the Project Area range from 1 to 30 percent, with the majority of slopes at 1 to 7 percent.

Table 11-1: Soil Types (Greater Than One Percent of the Project Area)

Soil Type[a]	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (inches)	Acres in Project Area	Percent of Project Area
HkA (Houdek-Prosper loams, 0 to 2 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	795.2	3.8
HkB (Houdek-Prosper loams, 1 to 6 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	446.2	2.1
CnA (Clarno-Crossplain-Davison complex, 0 to 2 percent slopes)	Fine, smectitic, mesic Typic Natrustolls	Fine	Clayey till	Moderately well drained	Greater than 80	220.3	1.0
Tp (Tetonka silt loam, 0 to 1 percent slopes)*	Fine, smectitic, mesic Argiaquic Argialbolls	Fine	Local alluvium over loamy till	Poorly drained	Greater than 80	712.1	3.4
WmB (Glenham loam, undulating)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	2,309.3	11.0
WmC (Glenham loam, rolling)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	439.3	2.1
WnA (Glenham-Prosper loams, 0 to 6 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Fine-loamy till	Well drained	Greater than 80	1,195.3	5.7
WnB (Glenham-Prosper loams, 1 to 6 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Fine-loamy till	Well drained	Greater than 80	6,769.6	32.3
WpA (Glenham-Cavo loams, nearly level)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	237.8	1.1

Soil Type[a]	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (inches)	Acres in Project Area	Percent of Project Area
WpB (Glenham-Cavo loams, undulating)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	1,297.6	6.2
Wzc (Glenham-Java loams, rolling)	Fine-loamy, mixed, superactive, mesic Typic Argiustolls	Fine-Loamy	Loamy till	Well drained	Greater than 80	1,793.2	8.6
ZyD (Java-Glenham loams, hilly)	Fine-loamy, mixed, superactive, mesic Entic Haplustollls	Fine-loamy	Loamy till	Well drained	Greater than 80	642.9	3.1
ZyE (Betts-Java loams, steep)	Fine-loamy, mixed, superactive, mesic Typic Calciustepts	Fine-loamy	Loamy till	Well drained	Greater than 80	2,084.8	9.9

Source: NRCS, 2018a
* designates hydric soil
(a) Only soil types greater than 1 percent of the Project Area are included. Therefore, the total does not add up to 100 percent.

11.2.1.3 Prime Farmland Soils

NRCS farmland classifications include "prime farmland" (land that has the best combination of physical and chemical characteristics for the production of crops), "farmland of statewide importance" (land other than prime farmland that has a good combination of physical and chemical characteristics for the production of crops), and "not prime farmland" (land that does not meet qualifications for prime farmland), among other classifications. Most of the farmland soil in the Project Area is classified as either "prime farmland if irrigated" (56.5 percent) or "not prime farmland" (29.0 percent); no prime farmland is currently irrigated in the Project Area. Farmland soil types within the Project Area are shown in Table 11-2.

Table 11-2: Farmland Soil Types Within the Project Area

Farmland Soil Type	Area (acres)	Percentage of Project Area
Prime farmland	284	1.4
Prime farmland if irrigated[a]	11,854	56.5
Farmland of statewide importance	2,752	13.1
Not prime farmland	6,089	29.0
Total	**20,979**	**100**

Source: NRCS, 2018a
(a) No prime farmland is currently irrigated in the Project Area.

11.2.2 Soil Resources Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to soil resources from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

11.2.2.1 Wind Farm

Construction of the wind turbine pads, access roads, underground collection lines, Project substation, permanent meteorological towers, O&M facility, switchyard, and temporary laydown yard would result in approximately 717.5 acres of temporary disturbance and approximately 75.3 acres of permanent impacts (assumes construction of all 86 potential turbine locations; see Table 10-1) to surface soils within the Wind Farm impact area. During construction, existing vegetation would be removed in the areas where wind facilities would be installed or staged, potentially increasing the risk of erosion, which is discussed in more detail below. Potential impacts to agricultural soils from the Wind Farm, and associated mitigation measures, are discussed in Section 20.2.2. As discussed in Chapter 23.0, the facility would be decommissioned at the end of the Project's operating life. Facilities would be removed in accordance with applicable State regulations and County agreements, except that access roads may be left in place if requested by the landowner. Disturbed surfaces would be graded, reseeded, and restored as nearly as

possible to their pre-construction conditions. After decommissioning of the Project is complete, no irreversible changes to soil resources would remain beyond the operating life of the Project.

The Applicant will design the Wind Farm layout to limit construction cut and fill work, and no turbines have been located in steep slope areas. Surface disturbance caused by construction of the wind turbines and associated infrastructure may result in the soil surface becoming more prone to erosion. Another potential issue is soil compaction, which can occur from use of heavy equipment. Silt and clay soils are especially susceptible to compaction. Measures to reduce impacts to soils would be implemented during construction. These may include the use of erosion and sediment control BMPs during and after construction, noxious weed control, segregating topsoil from subsurface materials, reseeding of disturbed areas based on agency recommendations, the use of construction equipment appropriately sized to the scope and scale of the Project, verifying access road grades fit closely with the natural terrain, proper onsite disposal of soil cuttings from turbine foundation construction, and maintaining proper drainage.

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

11.2.2.2 Transmission Facility

Development and construction of the Gen-Tie Line would result in up to approximately 176.9 acres of temporary disturbance and approximately 0.01 acre of permanent disturbance to surface soils within the Gen-Tie Line impact area. Potential impacts to agricultural soils from the Gen-Tie Line, and associated mitigation measures, are discussed in Section 20.2.2.

The Applicant will design the Gen-Tie Line to limit construction cut and fill work, and try not to locate Gen-Tie Line structures in steep slope areas. Surface disturbance caused by construction of the transmission structures may result in the soil surface becoming more prone to erosion or compacted which can result from use of heavy equipment. Mitigation measures to reduce impacts to soils would be implemented as outlined above for the Wind Farm. Construction of the Gen-Tie Line would also be

covered under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR, including implementation of a SWPPP.

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

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

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

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

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

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

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

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

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

12.1 Groundwater Resources

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

12.1.1 Existing Groundwater Resources

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

12.1.2 Groundwater Resources Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to groundwater resources from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

12.1.2.1 Wind Farm

Construction of the Wind Farm may require dewatering of excavated areas due to shallow groundwater, particularly for wind turbine foundations or collector line trenches. Construction dewatering may temporarily lower the water table in the immediate area and may temporarily lower nearby surface water elevations depending on the proximity and connectivity of groundwater and surface water, and extent of the excavated area.

Groundwater dewatering is not anticipated to be a major concern associated with the Wind Farm because wind turbines are more likely to be placed at higher elevations where the water table tends to be deeper. Should groundwater be encountered that must be dewatered, the necessary permits would be obtained and associated requirements implemented, including limiting dewatering timeframes. Dewatered groundwater would be properly handled to allow sediments to settle out and be removed before the water is discharged, to reduce sedimentation of surface waters.

The introduction of contaminants into groundwater due to accidental release of construction related chemicals, fuels, or hydraulic fluid could have an adverse effect on groundwater quality, most notably near shallow water wells. Spill-related effects are primarily associated with fuel storage, equipment refueling, and equipment maintenance. A Spill Prevention, Control and Countermeasure (SPCC) will be developed for the project. Implementation of BMPs associated with the SPCC would minimize the impacts on groundwater. BMPs for spill-related effects would include storing fuels within secondary containment devices, checking vehicles and equipment for leaks, performing refueling and equipment maintenance away from wells, maintaining a spill response kit, and appropriate reporting protocols for any spills.

12.1.2.2 Transmission Facility

Construction of the Gen-Tie Line would have the potential for similar effects to groundwater. As with the Wind Farm, necessary permits would be obtained and associated requirements implemented. BMPs for spill-related effects associated with the SPCC as identified above for the Wind Farm would be implemented.

12.2 Surface Water Resources

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

12.2.1 Existing Surface Water Resources

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

12.2.1.1 Hydrology

The Project Area is located within the Middle James River watershed, part of the Missouri River Basin surface water drainage system. Drainage from the Project Area is via East Pearl Creek, a tributary to Pearl Creek and unnamed tributaries to Pearl Creek and Silver Creek. A small area of the northeastern portion of the Project Area drains to tributaries to Cain Creek (Figure A-9).

Prairie potholes, depressions formed by previous glacier activity, are common in the Upper Midwest region. These potholes fill with rain and snowmelt and become depression wetlands (primarily freshwater marshes). Many prairie potholes are temporary and are not connected to surface waters, but permanently filled prairie potholes also exist (U.S. Environmental Protection Agency [EPA], 2018a).

To characterize surface water resources more accurately, including wetlands, streams, and other surface waters, within the Project Area, a wetland delineation was completed in June and October 2018. The results of the delineation and a discussion of Project impacts to wetlands and waterbodies are discussed in Section 13.3.

12.2.1.2 National Park Service Nationwide Rivers Inventory

The NRI is a "listing of more than 3,400 free-flowing river segments in the U.S. that are believed to possess one or more 'outstandingly remarkable' natural or cultural values judged to be of more than local or regional significance. Under a 1979 Presidential Directive, and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments" (NPS, 2017b). There are no NRI-listed rivers within the Project Area. The nearest NRI-listed rivers are the James River, located 35 miles northeast of the Project Area, and the White River, located approximately 53 miles southwest of the Project Area.

12.2.1.3 Impaired Waters

The CWA requires states to publish biannually a list of streams and lakes that are not meeting their designated uses because of excess pollutants. These streams and lakes are considered impaired waters (EPA, 2018b). The list, known as the 303(d) list, is based on violations of water quality standards. States establish priority rankings for waters on the 303(d) list and develop the total maximum daily load (TMDL) of a pollutant that the water can receive and still safely meet water quality standards. There are no watersheds listed as impaired on South Dakota's 2018 303(d) list within the Project Area (SDDENR, 2018).

12.2.1.4 Floodplains

According to the Federal Emergency Management Agency (FEMA) Flood Map Service Center, studies to determine a flood hazard for Hand County have not been completed and a flood map has not been published at this time (FEMA, 2017). The Hand County Flood Plain Manager indicated the Project Area is not located in a mapped floodplain (Appendix B). Narrow floodplains exist along intermittent streams, including East Pearl and Silver Creeks, in southeastern Hand County.

12.2.2 Surface Water Resources Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to surface water resources from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

12.2.2.1 Wind Farm

Potential impacts to water resources from the construction and operation of the Wind Farm may include deterioration of surface water quality through sedimentation, impacts to drainage patterns, and increased runoff due to the creation of impervious surfaces. Wind Farm facilities have been designed to avoid impacts on surface water resources. Therefore, the Wind Farm is not expected to cause significant changes in runoff patterns or volume of runoff, nor is it expected to have adverse impacts on existing hydrology.

In general, because wind turbines would be located at higher elevations within the Project Area to maximize wind exposure, impacts to streams and drainage ways are not anticipated. The underground collection lines may temporarily impact surface drainage patterns during construction if the underground collection lines are trenched through drainage ways; however, these impacts would be short-term, and existing contours and drainage patterns are expected to be restored shortly after trenching. Where stream/drainage crossings cannot be avoided for construction of access roads, appropriately designed

culverts or low water crossings would be placed to maintain the free flow of water. As such, the Wind Farm would not result in changes to existing drainage patterns in the Project Area.

The creation of impervious surfaces reduces the capacity of an area to absorb precipitation into the soil and tends to increase the volume and rate of storm water runoff. The Wind Farm would create up to 12.5 acres of impermeable surface through the construction of concrete foundations for the turbines (assumes all 86 potential turbine locations), permanent meteorological towers, the O&M facility, the switchyard, and the Project substation (see Table 10-1). The wind turbine pads, access roads, and parking lots for the O&M facility and Project substation yards would be constructed of compacted gravel and would not be paved. However, this level of compaction may inhibit infiltration and may increase runoff in these areas. As discussed in Section 11.2.2, appropriate storm water management BMPs would be implemented during construction and operation of the Project to control erosion and reduce the potential for sediment-laden runoff from exposed soils during precipitation events. These BMPs are anticipated to adequately mitigate for runoff due to the increase in impervious surface. After decommissioning of the Project is complete, no irreversible changes to surface water resources would remain beyond the operating life of the Project.

Due to the lack of NRI-listed rivers and CWA 303(d) listed waters within the Wind Farm, construction and operation of the Wind Farm poses no impact to these resources. Therefore, no mitigation is required for impacts to NRI-listed rivers and CWA 303(d) listed waters.

In natural systems, floodplains serve several functions that include storing excess water during high-flow/high-runoff periods, moderating the release of water during high-flow/high-runoff periods, reducing flow velocity, and filtering out sediments and other pollutants. The placement of fill into floodplains reduces the effectiveness of these functions. As noted previously, no floodplains have been identified in the Project Area other than narrow floodplains of East Pearl and Silver Creeks. Where floodplain crossings in these streams cannot be avoided for construction of access roads, appropriately designed culverts or low water crossings would be placed to maintain the free flow of water.

12.2.2.2 Transmission Facility

Impacts to water resources as a result of construction and operation of the preferred or alternate Gen-Tie Line route would be similar to those of the Wind Farm. Gen-tie line structures have been sited to avoid surface water resource impacts and are not anticipated to cause changes in runoff patterns or volume. Should any stream/drainage crossing be necessary for Gen-Tie Line access roads, appropriately designed

culverts or low water crossings would be placed to maintain the free flow of water, resulting in no changes to existing drainage patterns in the Project Area.

The structures for the Gen-Tie Line would be directly embedded and either backfilled with crushed rock or native soils; thus the increase in impermeable surface would be limited to the circumference of the structure. As discussed for the Wind Farm, appropriate storm water management BMPs would be implemented during construction and operation of the Project to control erosion and reduce the potential for sediment-laden runoff from exposed soils during precipitation events.

As with the Wind Farm, no NRI-listed rivers or CWA 303(d) listed waters occur within the primary or alternate Gen-Tie Line routes, and construction and operation of the Gen-Tie Line would not impact these resources.

12.3 Current and Planned Water Uses

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

12.3.1 Current or Planned Water Use

The Mid-Dakota Rural Water System 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. Intermittent streams within the Project Area, include East Pearl and Silver Creeks and their tributaries (Figure A-9). There are no perennial streams within the Project Area. Pearl Creek and the upstream Pearl Lake (both located outside the Project Area) support recreational activities, such as fishing.

12.3.2 Current or Planned Water Use Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to current or planned water use from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

12.3.2.1 Wind Farm

The proposed Wind Farm would not have impacts on either municipal or private water uses in the Project Area. Water storage, reprocessing, or cooling is not required for either the planned construction or operation of the facilities. The Wind Farm facilities would not require deep well injection. The Wind Farm operation would not require the appropriation of surface water or permanent dewatering.

Water usage at the O&M facility would be similar to household volume, fewer than 5 gallons per minute. The Applicant either would use the rural water system or a water supply well.

If the Applicant were to use the rural water system, the Applicant would coordinate with the Mid-Dakota Rural Water System to locate and map its network of distribution lines within the Project Area and determine if a rural water supply connection is necessary for the Project. Existing water lines would be avoided by Project design and construction. If necessary, the Applicant would obtain required permits or crossing agreements from the Mid-Dakota Rural Water System.

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

Construction of the Wind Farm can interrupt the availability of groundwater through construction dewatering. Construction dewatering may temporarily lower the water table such that nearby wells may lose some of their capacity. However, the Wind Farm is not anticipated to require major dewatering; therefore, interruption of groundwater availability caused by dewatering is unlikely. As a result, no negative impacts on groundwater resources are anticipated.

The Wind Farm would have no impact on surface water availability or use for communities, agriculture, recreation, fish, or wildlife.

12.3.2.2 Transmission Facility

The Gen-Tie Line would not impact municipal or private water uses in the Project Area. Water for construction of the Gen-Tie Line would be from outside sources and used for dust control. No water storage, reprocessing, or cooling is required for the Gen-Tie Line, and no deep well injection would be necessary. Operation of the Gen-Tie Line would not require surface water, permanent dewatering, or other water usage in the form of a connection to the rural water system or a supply well and would not affect aquifer recharge rates. If necessary, the Applicant would obtain crossing agreements from the Mid-Dakota Rural Water System to potentially cross existing water supply infrastructure.

No major dewatering is anticipated for the Gen-Tie Line; therefore, interruption of groundwater availability caused by dewatering is unlikely. Furthermore, the Gen-Tie Line would have no impact on surface water availability or use for communities, agriculture, recreation, fish, or wildlife.

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

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

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

13.1 Vegetation

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

13.1.1 Existing Vegetation

The Project Area is in the James River Lowland and Southern Missouri Coteau Level IV Ecoregion within the Northern Glaciated Plains and Northwestern Glaciated Plains Level III Ecoregion. According to the USGS National Land Cover Database (NLCD), herbaceous/grassland (51.9 percent), cultivated crop (24.2 percent), and hay/pasture (19.2 percent) compose the majority of the land cover within the Project Area, while the remaining land cover makes up 4.7 percent of the Project Area (USGS NLCD, 2011; Homer et al., 2015).

Two federally threatened plant species occur in South Dakota, the Leedy's roseroot (*Rhosiola integrifolia* ssp. *leedyi)* and the western prairie fringed orchid *(Platanthera praeclara).* According to a review of the USFWS IPaC, neither of the species occurs in Hand County or has the potential to occur in the Study Area (USFWS, 2018a).

13.1.1.1 Grassland Habitat Assessment

A site-specific grassland habitat assessment of the Study Area was conducted between July 17 and September 14, 2018, to provide an assessment of the quality of all potential Project grasslands, both

disturbed and previously undisturbed (Appendix E) and to therefore provide information to the Applicant to avoid and minimize impacts to higher quality undisturbed grasslands. Potentially undisturbed grasslands (i.e., grasslands that have not previously been tilled) were initially identified based on publicly available data in the *Quantifying Undisturbed (Native) Lands in Eastern South Dakota*: 2013 digital data layer (Bauman et al., 2016) and recent aerial photography. All grassland tracts were field checked, either by traversing on foot, or making observations from adjacent public roads. This assessment defined "undisturbed native grasslands" as those grasslands that (1) showed no evidence of previous tilling and (2) were dominated entirely by native tallgrass species; any grassland parcel with these characteristics in the Study Area would be given a Rank of 1, or Excellent (Appendix E). Parcels found to have introduced grasslands, such as smooth brome (*Bromus inermis*) prevalent but still had common occurrences of native grasses were given a Rank of 2, or Above Average. Parcels dominated by introduced grasses with infrequent native grasses or no native grasses present were given ranks of 3 (Average) and 4 (Fair), respectively. Grasslands classified as Rank 5 (Poor) included all those classified as hayfields as well as any grassland severely overgrazed by livestock (Appendix E).

This assessment determined that grassland tracts in the Study Area are dominated by a mix of non-native grasses such as smooth brome, Kentucky bluegrass (*Poa pratensis*), and fescue (*Festuca* spp.). Additional species documented in some of the grassland tracts included prairie coneflower (*Ratibida columnifera*) and thistle (*Cirsium* spp.). It was also determined during the field visit that some of the herbaceous/grassland tracts were planted with alfalfa (*Medicago sativa*).

Overall, the review of the grassland tracts in the Study Area reveals localized fragmentation impacts due to land conversion and vegetation loss primarily associated with agriculture, but also due to invasive and noxious species; pesticides; and urbanization through road construction, distribution and transmission lines, pipelines, fiber optic lines, gravel pits, and residential development. No undisturbed native grasslands (parcels ranked as Excellent) were documented in the Study Area, and only limited, isolated patches of Above Average grasslands were found, generally limited to the edges of ravines (Appendix E). Thirteen of the parcels evaluated appeared to be previously tilled but were planted in grasses dominated by smooth brome at the time of the evaluation; these disturbed grasslands were all ranked as 4 (Fair).

The limited number of trees within the Study Area are primarily found around residences and shelterbelts. Trees identified during the grassland habitat assessment include eastern red cedar (*Juniperus virginiana*) and Russian olive (*Eleagnus angustifolia*), which are invading some of the grassland tracts in the Study Area.

13.1.1.2 Noxious Weeds

Noxious weeds are regulated by state (SDCL 38-22) and federal (U.S. Code of Federal Regulations [CFR] 2006) statutes and regulations designed to stop the spread of plants that are detrimental to the environment, crops, livestock, and/or public health. According to the South Dakota Department of Agriculture (SDDOA), four state-listed and two county-listed noxious weed species known to occur in Hand County, as identified in Table 13-1 (SDDOA, 2017a and 2017b).

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

Common Name	Scientific Name
State Noxious Weeds	
Leafy spurge	*Euphorbia esula*
Canada thistle	*Cirsium arvense*
Perennial sow thistle	*Sonchus arvensis*
Hoary cress	*Cardaria draba*
County Noxious Weeds	
Absinth wormwood	*Artemisia absinthium*
Musk thistle	*Carduus nutans*

Source: SDDOA, 2017a and 2017b

13.1.2 Vegetation Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to vegetation resources from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures if applicable.

13.1.2.1 Wind Farm

The following subsections discuss potential effects to vegetation resources from the Wind Farm facility.

13.1.2.1.1 Grassland

As noted above, no grasslands identified as Excellent (undisturbed native grasslands) were documented in the Study Area. The isolated Above Average undisturbed (i.e., not previously tilled) grassland tracts in the Study Area are primarily on slopes; the vast majority of the grasslands in the Study Area are dominated by introduced species such as smooth brome, with limited to no native species remaining.

The Applicant has sited the Wind Farm and associated facilities to minimize impacts to the isolated patches of Above Average grasslands to reduce further fragmentation of grasslands with native species still present. Of the total temporary impacts from the Wind Farm (717.5 acres), approximately 12.1 acres (1.7 percent of the impact, or 0.06 percent of the Project Area) would occur in Above Average grasslands.

Of the total permanent impacts from the Wind Farm (75.3 acres), only 1.3 acres (1.7 percent of the impact, or 0.01 percent of the Project Area) would occur in Above Average grasslands.

The vast majority of grassland impacts would be to lower quality grasslands dominated by introduced species, affected by grazing impacts, and/or experiencing effects of invasive species such as noxious weeds or woody vegetation. To further minimize impacts to grasslands, the Applicant has sited infrastructure in areas where disturbance has occurred previously, to the extent practicable. The minimization measures include utilizing existing roads for access, limiting construction of new roads, and restoring areas of temporary disturbance to minimize impacts.

The Applicant would restore and regrade disturbed soils after construction. The construction contractor would coordinate with the NRCS and/or the landowner on seed mixes for revegetation. The seed mixes and revegetation plan would be developed as part of the SWPPP for the Project.

13.1.2.1.2 Noxious Weeds

Project activities have the potential to result in the spread of noxious weed species resulting from construction equipment introducing seeds into new areas, or erosion or sedimentation due to clearing ground in the construction areas. The spread of noxious weeds would be managed via use of appropriate seed mixes in non-cultivated areas and SWPPP compliance to restore vegetation in disturbed areas. If listed noxious weed infestations are found in non-cultivated disturbed areas after construction activities are completed, each area would be evaluated and addressed separately, in coordination with landowners. Areas temporarily disturbed due to construction would be re-vegetated with vegetation types matching the surrounding agricultural landscape. Restoration would be initiated as soon as possible after construction activities are completed.

13.1.2.2 Transmission Facility

The up to 7-mile Gen-Tie Line has been located in areas where previous disturbance has occurred, to the extent feasible, which would reduce habitat fragmentation and impacts to vegetation. Of the total temporary impacts from the Gen-Tie Line, up to 9.1 acres (up to 7.5 percent of the impact, or 0.04 percent of the Project Area) would occur in Above Average grasslands. Because the total permanent impact from the Gen-Tie Line would be no more than 0.01 acre, permanent impacts to Above Average grassland would be substantially less than 0.01 acre. Any temporary impacts to grasslands along the Gen-Tie Line route would be restored as described above for the Wind Farm.

13.2 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, promote communication between project proponents and federal/State agencies, and provide a practical approach to address wildlife conservation concerns at all stages of land-based wind energy development. SDGFP, in cooperation with the South Dakota Bat Working Group, has also developed siting guidelines for wind energy projects to address potential impacts to natural resources (South Dakota Bat Working Group and SDGFP, undated). These guidelines are generally consistent with the WEG, but also provide guidance for other non-wildlife resources (e.g., land use, noise, visual resources, soil erosion, and water quality).

The Applicant conducted site-specific pre-construction wildlife studies following the USFWS Land-Based WEG (USFWS, 2012) and the ECPG (USFWS, 2013). The Applicant met with representatives from the USFWS and SDGFP to solicit comments and/or concerns on wildlife resources with potential to occur within the Project Area, as well as to discuss studies planned for the Project. An agency coordination summary is included in Section 27.2 and Appendix B.

13.2.1 Existing Wildlife

Wildlife identified within the Study Area are described below, followed by a discussion of the potential effects of the proposed Project's construction and operation on wildlife, as well as measures to avoid and minimize potential effects.

13.2.1.1 Initial Site Assessment

An informal WEG Tier 1 and Tier 2 analysis, consisting of a review of available desktop information, was completed to assess species of concern and their habitats. Data sources included the USFWS Information for Planning and Conservation (IPaC) website, South Dakota Natural Heritage Database, USGS Breeding Bird Survey, and aerial imagery. Additional input was received from USFWS and SDGFP representatives on August 15, 2017, in relation to federally protected species, state-listed species, species of greatest conservation need, and habitats associated with those species. Based on these initial data reviews and comments received from the USFWS and SDGFP, additional Tier 3 field surveys were conducted to further evaluate wildlife resources at the Project (see Section 13.2.1.4). The review of the information above is consistent with the Tiered approach of the WEG.

13.2.1.2 Federal Special-Status Terrestrial Species

According to a review of the USFWS IPaC, three federally listed terrestrial species protected under the Endangered Species Act (ESA) have the potential to occur in the Study Area (Table 13-2) (USFWS, 2018a). In addition, bald and golden eagles have the potential to occur in the Study Area. These species are discussed in the following subsections.

Table 13-2: Federally Listed Terrestrial Species Potentially Occurring in Study Area

Species	Scientific Name	Federal Status	State Status	Potential to Occur
Bald eagle	*Haliaeetus leucocephalus*	*	--	Presence confirmed during Tier 3 surveys occurring at the Study Area
Golden eagle	*Aquila chrysaetos*	*	--	Presence confirmed during Tier 3 surveys at the Study Area
Northern long-eared bat	*Myotis septentrionalis*	Threatened	--	The Project lacks suitable summer habitat; potential seasonal migrant
Rufa red knot	*Calidris canutus*	Threatened	--	Typically a coastal species, unlikely to occur due to a lack of stopover habitat within the Study Area
Whooping crane	*Grus americana*	Endangered	Endangered	Study Area is within the migration corridor; potential seasonal migrant

Source: USFWS IPaC (Accessed December 2018), https://gfp.sd.gov/userdocs/docs/ThreatenedCountyList.pdf
* Both bald and golden eagles are protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA).

13.2.1.2.1 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act of 1940 (BGEPA). Wintering bald eagles are often associated with lakes, rivers, and reservoirs where they feed primarily on fish. Bald eagles may also be found during migration and winter periods in areas away from major rivers if sufficient forage is available. If waterfowl concentrate in an area during winter, they could serve as a food base for eagles. Preferred nesting, foraging, and roosting bald eagle habitats include large, mature trees near water with abundant fish and waterfowl prey, especially in areas with little disturbance. The small patches of isolated wooded habitat in the Study Area are not anticipated to be high quality or preferred nesting habitat for bald eagles; however, with increasing bald eagle populations, nesting eagles are also being found in areas away from major waterbodies. The larger wetlands in the Study Area provide potential foraging habitat for bald eagles.

The bald eagle is a resident species throughout South Dakota, with potential to utilize suitable areas year-round. Bald eagles have been observed within the Study Area, and the closest known nest is approximately 5.5 miles north of the Study Area. Refer to Section 13.2.1.4.1 for more details**.**

13.2.1.2.2 Golden Eagle

The golden eagle (*Aquila chrysaetos*) is also protected by the BGEPA. Golden eagles are usually found in open country, prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions. Preferred nesting habitat (nesting occurs from February to August) includes rock outcrops, cliff ledges, and trees, while foraging habitat includes prairies, sagebrush, and open woodlands. While the Study Area does contain some small patches of isolated wooded habitat that may be suitable for nesting eagles, these areas are not anticipated to be high quality or preferred nesting habitat for golden eagles, and there are no cliffs or rocky outcrops. The grasslands within the Study Area could provide potential foraging habitat for golden eagles.

Golden eagles were observed during the first year of surveys at the Study Area; no golden eagle nests were documented within 10 miles of the Study Area. See Section 13.2.1.4.1 for more details**.**

13.2.1.2.3 Northern Long-Eared Bat

The northern long-eared bat (*Myotis septentrionalis;* NLEB) is listed as threatened under the ESA; however, incidental take of the species due to operation of wind projects is exempt under a 4(d) rule (81 Federal Register 9: 1900-1922, 2016). The NLEB was listed as threatened under the ESA in 2015, and the USFWS issued the final 4(d) rule for the NLEB on April 2, 2015.

The NLEB is a forest bat species that roosts alone or in colonies under bark, cavities, or crevices in living or dead trees. The NLEB bat generally flies under a canopy, feeding on moths, fleas, leafhoppers, caddisflies, and beetles. As noted above, the Study Area contains small amounts of generally isolated wooded land cover and therefore contains little suitable summer habitat for the NLEB.

The Applicant conducted site-specific acoustic presence/absence surveys for NLEB during the summer of 2018 (Appendix F). All surveys followed the current USFWS *Range-Wide Indiana Bat Summer Survey Guidelines* (Guidelines; USFWS, 2018b), which also applies to NLEB. A desktop assessment of the Study Area was done to determine potential suitable summer habitat and to identify appropriate habitat for three acoustic sites to sample. Three acoustic sites were sampled, using two detectors deployed at each site for 4 nights, for a total of 24 detector nights. Bats were surveyed using Song Meter full-spectrum ultrasonic detectors (SM4; Wildlife Acoustics, Inc., http://www.wildlifeacoustics.com).

Acoustic presence/probable absence surveys were conducted from July 5 to 10, 2018. Acoustic monitoring began before sunset and continued for the entire night. If weather conditions, such as persistent rain (30 or more minutes), strong sustained winds (greater than 9 miles per hour [mph] for 30 or more minutes), or cold temperature (below 10 degrees Celsius [50 degrees Fahrenheit] for 30 or more minutes) occurred, then the acoustic site subject to those conditions was surveyed for an additional night. Omnidirectional detector microphones were positioned at least 9.8 feet (3.0 meters) off the ground and oriented horizontally. For each acoustic detector, the date, site description, site coordinates, tree species composition, stand age, vegetation community type, and weather data were recorded. Representative photographs of each acoustic site also were taken.

No potential NLEB calls were identified by the automated bat call identification feature in the software program Kaleidoscope (set to the versions approved by the USFWS for acoustic analysis of sensitive species); therefore, no qualitative review was necessary and no follow-up mist-net or telemetry surveys were performed. The acoustic survey results show probable absence of NLEB within the Study Area during the summer, but the species may pass through the Study Area as a seasonal migrant. There are no Natural Heritage Information System records of NLEB hibernacula within the vicinity of the Project; the nearest publicly available NLEB hibernaculum is in eastern Stearns County, Minnesota, more than 200 miles east (Minnesota DNR/USFWS, 2018).

13.2.1.2.4 Rufa Red Knot

The red knot (*Calidris canutus*) is listed as threatened under the ESA. The primary reason the red knot is listed as threatened is due to climate change and coastal development, in addition to overharvesting of the horseshoe crab. The red knot migration path can vary greatly, but they travel extreme distances, at times over 9,000 miles, from South America to North America. This species makes frequent stops to feed and rest in-between and prefers a habitat with their prey of choice, invertebrates, particularly small snails, crustaceans, and bivalves. This species is unlikely to occur in the Study Area, as it is primarily a coastal species and the Study Area lacks suitable stopover habitat in the form of intertidal, marine habitats, especially coastal inlets, estuaries, and bays. The nearest potential stopover habitat likely occurs along the Missouri River, which is approximately 35 miles west of the Study Area.

13.2.1.2.5 Whooping Crane

The whooping crane (*Grus americana*) is listed as endangered under the ESA, and endangered within the state according to the SDGFP. Whooping crane migration occurs in a corridor between the Texas gulf coast to Canada's northwest territories, during which the whooping crane is susceptible to mortality from manmade structures. The Study Area is located in bands where 75 percent of migratory whooping crane

observations have occurred (Pearse et al., 2018). According to the Cooperative Whooping Crane Tracking Project (CWCTP, 2016), no observations of whooping cranes have occurred within the Study Area. Based on CWCTP data, the nearest historical sighting to the Study Area occurred approximately 4 miles east.

The Applicant completed a site-specific whooping crane stopover habitat assessment (Appendix G) of the Study Area and surrounding 10-mile buffer. This assessment was done via desktop using a model developed by The Watershed Institute, Inc. (TWI). This model is recommended by the USFWS and was discussed with the USFWS South Dakota Ecological Services Field Office personnel during an in-person meeting on August 15, 2017. All wetlands within the Study Area and 10-mile buffer were assessed using the TWI model and scored based on the quality of the stopover habitat. The TWI model identified water features that could serve as potential stopover habitat for whooping cranes within the Study Area and the surrounding 10-mile buffer.

Suitable habitat for whooping cranes is scattered throughout the Study Area and is generally of lower quality than in surrounding areas. The highest concentration of higher quality suitable stop-over habitat (primarily pothole wetlands) occurs along the southwestern edge of the Study Area, but these areas are relatively less dense than the higher quality stopover habitat in surrounding landscapes. There is the potential for whooping cranes to use or fly through the area during the life of the Project, but this is not expected to be a frequent event given the low number of cranes in the population that migrates across the relatively wide (200+ miles) migration corridor, as well as the low number observed historically in the vicinity of the Project. Additionally, no whooping cranes have been observed, to date, during Tier 3 surveys occurring in the Study Area.

13.2.1.3 State-Listed Terrestrial Species

State-listed terrestrial species identified as potentially occurring within Hand County includes one species, the whooping crane. The whooping crane is listed as endangered within South Dakota and is also listed as federally endangered under the ESA and is discussed in Section 13.2.1.2.5.

13.2.1.4 Avian Studies

To determine the presence, relative abundance, and relative seasonal use of avian species that occur within the Study Area, the Applicant completed various surveys in accordance with Tier 3 of the WEG, Stage 2 of the ECPG, and USFWS and SDGFP guidance. Avian studies included raptor nest surveys, eagle/avian use surveys, prairie grouse lek surveys, and a whooping crane habitat assessment. Eagle/avian use point-count surveys were completed once monthly from May 2017 to April 2018 during Year 1. The

Year 2 surveys are ongoing and will continue through April 2019. The methods and results of the bird surveys are summarized below.

13.2.1.4.1 Raptor and Eagle Nest Surveys

Aerial raptor nest surveys were completed in spring of 2017 and 2018 (Appendix H) to characterize the raptor nesting community and locate raptor stick nests, including eagle nests. All nests located in 2017 were re-surveyed again in 2018. Aerial surveys were completed prior to leaf-out and during the breeding season when raptors would be actively tending nests, incubating eggs, or brood-rearing. Raptor nest surveys focused on locating stick nest structures in suitable raptor nesting substrate (trees, transmission lines, shelter belts, etc.). The details of the 2017 and 2018 survey methods and results are found in Appendix H. The most recent survey (2018) is summarized in the following paragraphs.

Non-Eagle Raptor Nests

The raptor nest survey area was defined as the wind turbine locations and a surrounding 1-mile buffer, although some raptor stick nests documented beyond the 1-mile buffer were opportunistically recorded. During May 2018, occupied active nests documented during the survey included red-tailed hawk (*Buteo jamaicensis*; n=32), great horned owl (*Bubo virginianus*; n=15); and bald eagle (n=1, more information below); the remaining documented raptor stick nests were of unknown species, with the majority appearing to be unoccupied nests. Within the survey area of the March 2018 turbine layout, 5 active nests (4 red-tailed hawk nests and 1 great-horned owl nest) and 13 unoccupied nests were recorded.

Eagle Nests

During May 2018, one occupied active bald eagle nest (nest ID #69) was located within the 10-mile buffer of the Study Area, and no eagle nests were located within the Study Area. The bald eagle nest was approximately 5.5 miles north of the Study Area. One eagle chick was observed within the nest.

13.2.1.4.2 Avian Use Surveys

Avian/eagle use point-count surveys were completed for the Project to evaluate species composition, relative abundance, and spatial characteristics of avian use in accordance with agency recommendations (Appendix I). The avian use survey was completed following the study plan, as discussed with the USFWS and SDGFP on August 15, 2017. Fixed-point avian use surveys were completed approximately once monthly at 13 points during the first year (May 2017 to April 2018). Six additional points were added for the second year of surveys (May 2018 to April 2019) when the Study Area expanded. The previous and ongoing surveys contained points representative of the habitat within the Study Area, and

survey coverage encompassed approximately 30 percent of the Study Area consistent with the WEG and ECPG.

Large bird surveys were completed for 60 minutes during each visit within an 800-meter survey radius. Small bird surveys were completed for 10 minutes before the 60-minute large bird surveys at the same survey points. The surveys provide standardized data for small and large bird species, eagles, and species of concern (i.e., federal- or state-listed threatened and endangered species [ESA, 1973], USFWS Birds of Conservations Concern [BCC; USFWS, 2008], and South Dakota Species of Greatest Conservation Need [SGCN; SDGFP, 2014]).

A total of 43 unique large bird species were identified during the 153 hours of surveys that occurred during the first year of large bird surveys. The most common species groups observed included waterfowl, gulls/terns, and waterbirds. Six golden eagles, four bald eagles, and two unidentified eagles were observed within the Study Area. Golden eagles were observed during the summer and winter seasons while bald eagles were observed during the spring and winter seasons. These eagles were observed in the southern and central portion of the Study Area. A total of 42 unique small bird species were observed during the first year of small bird surveys. The most common small bird species included the barn swallow (*Hirundo rustica*), red-winged blackbird (*Agelaius phoeniceus*), and house sparrow (*Passer domesticus*). A second year of large and small bird surveys are ongoing through April 2019.

13.2.1.4.3 Birds of Conservation Concern

Nine species listed on the BCC for the Prairie Pothole Region were observed during avian use surveys: bald eagle, Swainson's hawk (*Buteo swainsoni*), peregrine falcon (*Falco peregrinus*), upland sandpiper (*Bartramia longicauda*), marbled godwit (*Limosa fedoa*), black tern (*Childonias niger*), red-headed woodpecker (*Melanerpes erythrocephalus*), grasshopper sparrow (*Ammodramus savannarum*), and dickcissel (*Spiza americana*).

13.2.1.4.4 Species of Greatest Conservation Need

SDGFP has identified SGCN within the South Dakota State Wildlife Action Plan (SDGFP, 2014). Four SGCN were recorded during surveys: American white pelican (*Pelecanus erythrorhynchos*), black tern, Le Conte's sparrow (*Ammodramus leconteii*), and marbled godwit.

Prairie grouse lek surveys were completed from mid-April to mid-May in 2018 in accordance with protocols outlined in the SDGFP Wildlife Survey Manual (SDGFP, 2009; Appendix I). SDGFP provided historic lek locations within and near the Study Area on August 15, 2017. The Study Area and associated 1-mile buffer were surveyed on April 7 and 17, 2018, via helicopter. All historic lek locations and

additional sites identified as having displaying grouse during the aerial surveys were surveyed from the ground on April 29, May 5, and May 12, 2018.

No grouse were observed at the historic lek locations. During the 2018 aerial surveys, four locations were identified as having displaying grouse but could not be confirmed as leks according to the SDGFP's definition, which is the traditional display area where two or more male grouse have attended in two or more of the previous 5 years. Three of these locations are located with the Study Area, and the fourth location is approximately 2 miles south of the Study Area (Appendix I). The four dancing/displaying locations documented in the 2018 surveys do not currently meet the definition of a lek since only 1 year of data has been collected in the last 5 years. Additional surveys will be conducted in spring 2019.

13.2.1.5 Bat Studies

Seven bat species have the potential to occur within the Study Area (Table 13-3). The only federally listed bat species with the potential to occur is the NLEB; species-specific studies for the NLEB are described above in Section 13.2.1.2.3.

Table 13-3: Bat Species Potentially Occurring in the Study Area

Common Name	Scientific Name	Habitat	Presence in Study 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.	The Study Area lacks suitable summer habitat and probable summer absence was confirmed with surveys; potential seasonal migrant

Common Name	Scientific Name	Habitat	Presence in Study Area
Little brown bat	*Myotis lucifugus*	Commonly forages over water; roosts in attics, barns, bridges, snags, and loose bark; hibernacula in caves and mines.	Likely
Western small-footed bat	*Myotis ciliolabrum*	Found in mesic conifer forest, also riparian woodland; roosts in rock outcrops, clay banks, loose bark, buildings, bridges, caves, and mines.	The Study Area lacks suitable habitat, potential seasonal migrant

Source: South Dakota Bat Management Plan (South Dakota Bat Working Group, 2004)

The Applicant conducted general acoustic bat surveys for 2 years, 2017 and 2018, with three detectors. Two detectors were paired with one installed approximately 50 meters aboveground on a tower and the other on the ground elevated about 1.5 meters. Another detector rotated between two locations, elevated about 1.5 meters. During 2017, surveys lasted from June 1 to October 15, and during 2018, surveys lasted from May 7 to October 15. Based on data collected at a single meteorological tower and temporary locations, both years showed similar results, with an average of 2.93 bat passes per detector night during 2017, and 3.63 bat passes per detector night during 2018 (Appendix J). AnaBat units at temporary stations recorded an average of 6.40 bat passes per detector night. Temporary stations were located near forested drainages, which may have attracted bats for roosting or foraging opportunities. Peak activity during both years occurred during the late summer/early fall timeframe. Based on data collected at the meteorological tower location, bat passes per detector night were also calculated during the bat fall migration period (FMP), defined as July 30 to October 14 for the Study Area. During the 2017 FMP, an average of 1.34 bat passes per detector night was estimated. The estimated average for the 2018 FMP was 1.37 bat passes per detector night. These estimates indicated that bat activity overall is relatively low at the Project. A comparison of activity estimates to other projects can be seen in Appendix A of both the 2017 and 2018 bat reports, included in this application as Appendix J.

13.2.2 Wildlife Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to wildlife resources from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

13.2.2.1 Wind Farm

Impacts to terrestrial wildlife species could occur during the construction and operation of the Wind Farm.

13.2.2.1.1 Avian Species

Impacts to avian species from the construction and operation of the Wind Farm can be direct or indirect and can occur at different temporal scales (e.g., during and after construction and operation) and spatial scales (e.g., within or outside the Project Area).

Direct impacts include fatalities from construction and operation of the Project. One of the closest operational facilities with publicly available data is the Wessington Springs facility in Jerauld County, South Dakota, approximately 22.5 miles (38 kilometers [km]) to the southeast. At the Wessington Springs facility, overall bird fatality estimates ranged from 0.89 to 8.25 fatalities/MW/year and averaged 4.57 fatalities/MW/year. In the Midwest, 38 comparable fatality rate estimates for all bird species combined are publicly available from studies of wind energy facilities. Overall bird fatality rates in the Midwest have ranged from 0.27 to 8.25 bird fatalities/MW/year and averaged 2.76 all bird fatalities/MW/year.

Most documented avian fatalities in North America are of passerines (small birds) which composed about 62.5 percent of wind turbine fatalities in 116 studies included in a recent analysis (Erickson et al., 2014). A total of 3,110 fatalities represented by 156 species of passerines were found during the studies. From this it was estimated that about 134,000 to 230,000 fatalities of small passerines occurred each year in the United States and Canada combined, a rate of 2.10 to 3.35 small birds/MW of installed capacity.

Although passerines make up the majority of fatalities at wind projects, the fatalities are spread out among multiple species, with each species experiencing relatively low direct impacts, ranging from 0.008 to 0.043 percent of respective continental populations suffering mortality each year from collisions with wind turbines. In comparison, researchers estimated that over 6 million passerines were killed annually from collisions with communication towers (passerines composed 97 percent of all fatalities), and annual mortality for individual species ranged from 1.2 to 9.0 percent of their estimated total populations for the 20 species most affected (Longcore et al., 2012, 2013).

Similar effects (direct impacts spread across multiple species of small birds with negligible effects on overall populations of any one species) would be anticipated for this Project. Post-construction monitoring (PCM) would occur to confirm the pre-construction risk analysis, and adaptive management measures will be documented in the Bird and Bat Conservation Strategy (BBCS).

Publicly available fatality data from post-construction studies at several wind projects located in complexes of prairie pothole wetlands and areas with relatively high use by waterfowl are expected to indicate the general range of waterfowl fatalities that could occur at the Project. Publicly available data from the PrairieWinds Project in North Dakota shows between 0.38 and 0.44 waterfowl

fatalities/MW/year. The PrairieWinds Project in South Dakota is 27.0 miles (48 km) south of the Project and documented a range of 0.45 to 0.78 large bird fatalities/MW/year, of which waterfowl accounted for a subset. Additional data from other projects in the Central Flyway with relatively high usage by migratory birds and waterfowl (Rugby Wind Project in North Dakota, Tatanka Wind Project in North and South Dakota, Wessington Springs in South Dakota, and Top of Iowa in Iowa) show fatality rates for all-birds and large-birds ranging from 0.38 to 8.25 bird fatalities/MW/year; however, no fatality estimates specific to waterfowl were calculated for these projects, and waterfowl-specific fatality estimates are expected to be substantially lower. The data available from the studies listed above indicate that while wind projects located in proximity to waterfowl habitat do result in some fatalities, the rates do not appear to approach levels that would affect populations (in 2016, 48.4 million breeding ducks and 11.8 million migrating mallards, as documented in the USFWS' Waterfowl Population Status report [USFWS, 2016]) – and some studies have shown no waterfowl fatalities at all even in areas with high waterfowl use during operations (Top of Iowa). PCM would occur to confirm the pre-construction risk analysis, and adaptive management measures as documented in the BBCS would be implemented if impacts were higher than anticipated.

Publicly available diurnal raptor use estimates coupled with publicly available diurnal raptor fatality estimates are only available for the Wessington Springs facility. At the Wessington Springs facility, the mean annual diurnal raptor use estimate was 0.24 diurnal raptor/800-meter plot/20-minute survey. The estimated diurnal raptor use value within the Study Area was very similar to Wessington Springs, at 0.22 raptor/800-meter plot/20-minute survey. Raptor fatality rates at the Wessington Springs facility averaged between 0.06 and 0.07 diurnal raptor fatalities/MW/year. Based on the similar landscape and raptor use levels, similar levels of mortality might be expected for this Project. While collision mortality is well documented at most wind energy facilities, population level effects have not been detected or reported in the studies/reviews that have evaluated the issue. PCM would be completed for this Project, and the results of the PCM studies will be evaluated to see if impacts are as expected, or if adaptive management measures are needed.

Indirect impacts are often unintended, may produce unforeseen consequences to wildlife, and are difficult to predict. Indirect impacts will focus on what could occur for the Project, particularly habitat loss and/or alteration and the potential temporary or permanent displacement of avian species. Construction of the Project may result in grassland impacts that could lead to displacement of local avian species in the Study Area. The small amount of Above Average grasslands temporarily or permanently (see Section 13.1.2) impacted by the Project minimizes the potential impact to grassland birds using these habitats.

Studies in the Great Plains on the effects of wind energy development on grassland breeding birds found immediate displacement effects (first year) for three species, attraction for two species, and no effect on four species (Shaffer and Buhl, 2016). Over time, however, delayed effects (2 to 5 years post-construction) were observed for seven species, and no effects were observed for two species (Shaffer and Buhl 2016). Overall, seven of nine species of grassland birds showed some displacement up to 300 meters from wind turbines. The results, however, often varied across sites, distances, and time periods likely because of differences in life history traits, sensitivity to area and edge effects, habitat fragmentation, intra-or inter-specific competition, level of anthropogenic disturbance, or variable precipitation patterns (Shaffer and Buhl 2016).

Studies in the Great Plains on the effects of wind energy development on waterfowl examined changes in the breeding pair density of five species of waterfowl at two wind facilities in the Missouri Coteau of North Dakota and South Dakota over 3 years (Loesch et al., 2013). The densities for five species of duck pairs was either indistinguishable (14 of 30) between wind and reference sites or lower (16 of 30) on wind sites, depending on site, year, and species (Loesch et al., 2013). The overall pattern observed was consistent with behavioral avoidance, where breeding pairs continued to use wetland habitats but at reduced densities. Identifying the ultimate cause of the reduced breeding density, however, was challenging because of the limited temporal duration of the study, and confounding effects between land use and duration of development. This prevented the authors from drawing strong conclusions about the cumulative effects of wind energy development on breeding ducks (Loesch et al., 2013).

As part of the NEPA process for approval of the WAPA interconnection, the Project will comply with applicable mitigation measures specified in the UGP PEIS. The Applicant is committed to avoiding and/or minimizing impacts to avian species through Project design, construction, and operation by implementing measures that include:

- Prepare a BBCS 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;
- Design transmission lines and facilities using Avian Power Line Interaction Committee (APLIC) (APLIC, 2006; 2012) guidance to minimize the risk of electrocution and collision to avian species;
- Train O&M staff to recognize sensitive species;
- Conduct construction monitoring during whooping crane migration seasons, and stop construction activities within 1 mile of observed whooping cranes until the crane leaves;

- Conduct operational monitoring during whooping crane migration seasons; operations staff will be trained to identify whooping cranes, and if any are noted in the Project Area, turbines will be shut down within 2 miles of the crane until it leaves;
- Conduct post-construction fatality monitoring for 2 years to assess impacts;
- Site turbines and other above-ground wind facility infrastructure away from prairie grouse leks to the extent possible; additionally conduct 2 years of post-construction lek monitoring
- Site turbines and access roads to avoid USFWS Grassland or Wetland Easements;
- Avoid siting turbines in wetlands and waterbodies; and
- Minimize disturbance to Above Average grasslands.

13.2.2.1.2 Bats

Impacts to bats from the construction and operation of the Project could include both indirect and direct impacts. Indirect impacts would be minimized by siting the Project in an area that has minimal wooded habitat. Direct impacts would be minimized by feathering below the manufacturer's cut-in speed from July 15 to September 30, between sunset and sunrise when the temperature is above 50 degrees Fahrenheit, to reduce bat mortality.

The Wessington Springs Project, located approximately 24 miles (38 km) southeast of the Project, and the PrairieWinds Wind Project, located 30 miles (48 km) south of the Project, both contain similar habitat types to the Project, with relatively scattered patches of deciduous trees and open waterbodies available. Due to the geographic proximity and habitat similarity of the Project Area to Wessington Springs and PrairieWinds, it is assumed that bat mortality at the Project would be relatively low and follow similar patterns as those observed at these other facilities (e.g., 0.41 to 1.48 bat fatalities/MW/year) and within the region. As mentioned above, PCM studies would be completed for this Project, and the results of the PCM studies would be evaluated to see if impacts are as expected, or if adaptive management measures are warranted.

As part of the NEPA process for approval of the WAPA interconnection, the Project will comply with applicable mitigation measures specified in the UGP PEIS. The Applicant is committed to avoiding and/or minimizing impacts to bat species through Project design, construction, and operation by implementing measures that include:

- Locate the Project in an area with minimal bat habitat (limited wooded areas in isolated small patches);
- Minimize siting turbines in wooded patches;

- Minimize tree removal as much as feasible to reduce impacts to bat roosting habitat;
- Avoid tree removal from June 1 through July 31 to reduce potential impacts to roosts and other tree roosting habitats for NLEBs and other bat species;
- Feather blades to manufacturer's cut in speed from sunset to sunrise, when the temperature is above 50 degrees Fahrenheit from July 15 to September 30.

13.2.2.2 Transmission Facility

Impacts to terrestrial wildlife species could occur during the construction and operation of the transmission line.

13.2.2.2.1 Avian Species

As part of the NEPA process for approval of the WAPA interconnection, the Project will comply with applicable mitigation measures specified in the UGP PEIS. The Applicant is committed to avoiding and/or minimizing impacts to avian species through Project design, construction, and operation by implementing measures that include:

- Locate the up to 7-mile transmission line generally in areas where previous disturbance has occurred, thereby minimizing impacts to trees and associated wildlife; and
- Install avian flight diverters along the length of the Gen-Tie Line to minimize potential collision impacts to whooping cranes and other avian species.

13.2.2.2.2 Bats

Potential impacts from the Gen-Tie Line would be reduced by avoidance and minimization measures identified for the Wind Farm.

13.3 Wetlands and Waterbodies

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

13.3.1 Existing Wetlands and Waterbodies

A wetland field delineation was completed in June and October 2018, in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* and the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region – Version 2.0* (Regional Supplement) (USACE, 1987; 2010). The Wetland Survey Area covered:

- A 250-foot radius from the centerpoint of each turbine location;
- The footprint of the Project substation, switchyard, and laydown yard, plus a 200-foot buffer; and
- A 100-foot wide corridor from the centerline (200 feet total edge-to-edge) of underground collection lines, access roads, crane paths, and Gen-Tie Line routes.

Sample plots were established at multiple locations, and Wetland Determination Data Forms from the Regional Supplement were completed to characterize the Wetland Survey Area. In addition, approximately 20 percent of the Wetland Survey Area was delineated using offsite wetland determination methods following the October 2018 field survey due to frozen ground conditions.

As a result of the wetland delineation, 78 wetlands and 28 streams were identified within the Wetland Survey Area, for a total of approximately 40 acres of wetlands and 12,884 feet of streams. Classifications, acreages, and proportions of wetlands and streams within the Wetland Survey Area are provided in Table 13-4. Further information regarding wetlands and streams delineated within the Wetland Survey Area is provided in the Wetland Delineation Report in Appendix K.

Table 13-4: Delineated Wetlands and Streams Within the Wetland Survey Area

Cowardin Classification	Acreage	Proportion of the Wetland Survey Area
Palustrine Emergent (PEM)	38.6	1.6%
Palustrine Aquatic Bed (PAB)	0.0	0.0%
Riverine Intermittent/Ephemeral (R4/R5)	1.5	<0.1%
Palustrine Forested (PFO)	0.2	<0.1%
Palustrine Unconsolidated Bottom (PUB)	1.0	<0.1%
Uplands (UPL)	2,341.7	98.3%
Total	**2,383**	**100%**

Source: Wetland Delineation Report (Appendix K)

13.3.2 Wetland and Waterbody Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to wetland resources from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

13.3.2.1 Wind Farm

The Project would be sited to minimize impacts to wetland areas. Project components, such as wind turbines, Gen-Tie Line structures, and access roads, have been located generally in upland areas, avoiding low-lying wetlands and streams. Total permanent impacts to both wetlands and streams are anticipated to be less than 0.10 acre. Thus, impacts to wetlands and streams would be minor, and are anticipated to be

authorized under a USACE NWP 12. The Applicant would be required to adhere to all conditions of the USACE NWP 12, including, but not limited to, restoring all areas with temporary impacts to pre-construction conditions. Any revisions to the Project layout would similarly need to comply with USACE NWP 12 or other applicable federal CWA Section 404 requirements.

13.3.2.2 Transmission Facility

Construction of the Gen-Tie Line and associated facilities would result in only temporary impacts to wetlands and streams. The transmission facilities are also anticipated to be covered under USACE NWP 12.

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

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

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

14.1 Existing Aquatic Ecosystems

The Project Area is located within the James River watershed, part of the Missouri River Basin surface water drainage system. Drainage from the Project Area is via East Pearl Creek, a tributary to Pearl Creek and unnamed tributaries to Pearl Creek and Silver Creek. A small area of the northeastern portion of the Project Area drains to Cain Creek.. As described in Section 13.3, 78 wetlands and 28 streams were identified within the Wetland Survey Area for a total of approximately 40 acres of wetlands and 12,884 feet of streams.

Based on agency reviews, one federally-listed and no State-listed aquatic species were identified as potentially occurring within the Project Area, as shown in Table 14-1.

Table 14-1: Federal and State-Listed Aquatic Species Potentially Occurring in Project Area

Species	Federal Status	State Status	Potential to Occur
Topeka shiner (*Notropis topeka*)	Endangered	N/A	Resident or potential resident

Source: USFWS, 2018c; SDGFP, 2016

The Topeka shiner is a small minnow known to occupy the James River watershed. Sand Creek, which is south of the Project boundary, is a James River tributary.

14.2 Aquatic Ecosystems Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to aquatic ecosystems from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

14.2.1 Wind Farm

Construction and operation of the Wind Farm would avoid all aquatic ecosystems. Based on a drainage basin analysis from USGS (USGS, 2018c), the Cain Creek drainage basin is within a small portion of the

northeastern corner of the Project Area. However, no tributaries, streams, or other drainages are present within the overlapping drainage basin area. Furthermore, there are no anticipated construction activities within the overlapping drainage basin area. Accordingly, construction and operation of the Wind Farm are not anticipated to impact the Topeka shiner within Sand Creek or its drainage basin.

14.2.2 Transmission Facility

The Gen-Tie Line would avoid all aquatic ecosystems. Therefore, construction and operation of the Gen-Tie Line also would not impact any aquatic species.

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

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

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

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

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

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

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

15.1 Land Use

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

15.1.1 Existing Land Use

Land use within the Project Area is predominantly agricultural, consisting of a mix of cultivated crops, haylands, pasturelands, and rangelands among both undisturbed grasslands (i.e., not previously tilled) and disturbed grasslands (previously tilled and planted in Conservation Reserve Programs or other programs). As noted in Section 13.1.1 and Appendix E, no undisturbed native grasslands—defined as grasslands that showed no evidence of previous tilling and were dominated entirely by native tallgrass species—were documented in the Project Area. Occupied farm sites and rural residences are scattered throughout the Project Area. Figure A-10 is a land use map of the Project Area based on the classification system

specified in ARSD 20:10:22:18(1) and in the grassland habitat assessment prepared for the Project (Appendix E). The following land use classifications occur within the Project Area:

- Land used primarily for row and non-row crops in rotation;
- Pasturelands and rangelands;
- Haylands;
- Grasslands (including Above Average grasslands);
- Residential (i.e., residences)
- Rural residences and farmsteads, family farms, and ranches;
- Noise sensitive land uses; and
- Other (i.e., developed, open water, wetlands, wooded, shrub/scrub).

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

- Irrigated lands;
- Existing and potential extractive nonrenewable resources;
- Undisturbed native grasslands (Excellent condition);
- Other major industries;
- Public, commercial, and institutional use; or
- Municipal water supply and water sources for organized rural water systems.

In Hand County in 2012 (the latest available year for the U.S. Department of Agriculture [USDA] Census of Agriculture), approximately 62 percent of the farmland area was cropland, with corn for grain as the most common crop (USDA, 2012a). Soybeans for beans was the second most common cultivated crop in Hand County. Cultivated cropland in Hand County increased by 10 percent from 506,248 acres in 2007 to 565,623 acres in 2012 (USDA, 2012b). In Hand County in 2012, approximately 35 percent of the farmland area was pastureland (USDA, 2012a). Pastureland decreased by 36 percent from 28,999 acres in 2007 to 18,415 acres in 2012 (USDA, 2012b). The remaining approximately 3 percent of the farmland area in Hand County was in other unspecified uses.

Specific acreages of different crops within the Project Area, which change from year to year, are not available.

15.1.2 Land Use Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to land use from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

15.1.2.1 Wind Farm

The proposed Wind Farm is compatible with the existing agricultural land uses in areas surrounding the Project facilities. Agricultural uses would continue within the Project Area during construction and operation. Approximately 356.3 acres of agricultural land would be temporarily impacted by Wind Farm construction (assuming all 86 wind turbine locations), and 39.4 acres of agricultural land would be impacted during the life of the Wind Farm (less than 0.2 percent of the total land within the Project Area). Following construction, the temporary impact areas not maintained would be returned to pre-construction land uses, which primarily consist of cultivated croplands, hay, and pastureland. In accordance with the Wind Leases, the Applicant would work with landowners on decompaction efforts in addition to compensating for crop damage. Agricultural impacts are discussed further in Section 20.2.2.

As discussed in Chapter 23.0, the facility would be decommissioned at the end of the Project's operating life. Facilities would be removed in accordance with the wind lease, applicable State regulations, and county agreements, unless otherwise agreed to by the landowner. Disturbed surfaces would be graded, reseeded, and restored as closely as possible to their preconstruction conditions. After decommissioning of the Project is complete, no irreversible changes to land use would remain beyond the operating life of the Project.

There are 19 occupied residences within the Project Area. Based on the proposed Project layout of wind turbines, access roads, underground collection lines, and associated facilities, no residences or businesses would be displaced due to construction of the Wind Farm facilities.

15.1.2.2 Transmission Facility

The proposed Gen-Tie Line also is compatible with the existing agricultural land uses in areas surrounding the Project facilities. Up to 51.7 acres of agricultural land would be temporarily impacted by Gen-Tie Line construction, and up to 0.01 acre of agricultural land would be impacted by permanent facilities. Following construction, these areas would be returned to pre-construction land uses, except for the footprint of the directly embedded transmission structures. Any crop damage or compaction as a result of construction of the Gen-Tie Line would be remediated or compensated for by the Applicant per agreements with landowners.

Based on the proposed Project layout of Gen-Tie Line structures, there would be no displacement of residences or businesses due to construction of the Gen-Tie Line facilities.

15.2 Public Lands and Facilities

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

15.2.1 Existing Public Lands and Facilities

No cemeteries, places of worship, or other public or institutional uses are located within the Project Area. Public lands within the Project Area are discussed in more detail below; Figure A-11 is a map showing publicly owned or managed lands and easements within the Project Area.

15.2.1.1 USFWS Lands

Based on data provided by the USFWS Huron Wetland Management District on August 14, 2017, the Project Area includes Wetland Easement and Grassland Easement parcels managed by the USFWS. USFWS Wetland and Grassland Easements are part of the National Wildlife Refuge System and are managed for the protection of wildlife and waterfowl habitat.

No USFWS Waterfowl Production Areas (WPAs) are within the Project Area (Figure A-11). WPAs are satellite areas of the National Wildlife Refuge System and are managed for the preservation of wetlands and grasslands critical to waterfowl and other wildlife. One WPA is outside, the western boundary of the Project Area at the intersection of 208th Street and 366th Avenue.

15.2.1.2 NRCS Grassland Reserve Program

The northern end of the Project Area contains one Grassland Reserve Program parcel. Part of the Agricultural Conservation Easement Program, the Grassland Reserve Program is a voluntary conservation program to protect, restore, and enhance grassland, including rangeland, pastureland, shrubland, and certain other lands (NRCS, 2018b).

15.2.1.3 SDGFP Areas

One Game Production Area (East Pearl Game Production Area) is adjacent to, but outside, the Project Area boundary near the intersection of 207th Street and 367th Avenue (SDGFP, 2018b). Game Production Areas are State lands managed by the SDGFP for the production and maintenance of wildlife. The Project Area does not contain privately owned land leased for public hunting access by SDGFP (referred to as Walk-In Areas).

15.2.2 Public Lands and Facilities Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to public lands from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

15.2.2.1 Wind Farm

No USFWS WPA is located in the Project Area; therefore, no direct impacts to these public lands would occur from the Wind Farm. The Applicant coordinated with the USFWS, NRCS, and SDGFP regarding the exact boundaries of the USFWS Wetland and Grassland Easements, Grassland Reserve Program, and Game Production Areas shown on Figure A-11. The Applicant will not construct wind facilities on the Grassland Reserve Program Conservation Easement without prior consultation and approval of the landowner and the NRCS. Project construction could result in potential temporary impacts from the installation of underground collection lines on up to four USFWS Grassland Easements. Sweetland will obtain a Special Use Permit from USFWS for temporary impacts to Grassland Easements.

As discussed in Section 13.1.2, the Applicant would restore and regrade disturbed soils after construction. The construction contractor would coordinate with the NRCS and/or the landowner on seed mixes for revegetation. The seed mixes and revegetation plan would be developed as part of the SWPPP for the Project.

15.2.2.2 Transmission Facility

The preferred Gen-Tie Line route has been designed to avoid USFWS Wetland Easements and span USFWS Grassland Easements; no facilities would be placed on USFWS Wetland and/or Grassland Easements. The alternate Gen-Tie Line route has been designed such that no facilities would be placed on USFWS Wetland Easements, and to minimize surface disturbance and the placement of structures on USFWS Grassland Easements by paralleling roads to the extent feasible. Authorization to install structures on USFWS Grassland Easements will be evaluated through the WAPA NEPA process.

15.3 Sound

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

15.3.1 Existing Sound

The Project Area is located in rural Hand County. The Project Area contains cropland, pasturelands and rangelands, haylands, and rural residences scattered throughout. Farming activities and vehicular traffic

are likely the largest contributor to sound. Ambient sound measurements have not been recorded for the Project Area. A sound level modeling study was conducted for the Project (Appendix L) and is discussed in more detail in the following sections.

15.3.1.1 Sound Terminology

There are several ways in which sound (noise) levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-dB increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. Relative to this characteristic, a change in sound levels of less than 3 dB is imperceptible to the human ear.

Another mathematical property of decibels is that if one source of noise is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter that is used to measure sound is a standardized instrument.[4] It contains "weighting networks" (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as "pitch" or "tone." The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as "dBA." Sound pressure levels for some common indoor and outdoor environments are provided in Appendix L.

Because the sounds in the environment vary with time, many different sound metrics may be used to quantify them. There are two typical methods used for describing variable sounds. These are exceedance levels and equivalent levels, both of which are derived from a large number of moment-to-moment A-weighted sound pressure level measurements. Exceedance levels are values from the cumulative

[4] American National Standard Specification for Sound Level Meters, ANSI S1.4-1983 (R2006), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where "$_n$" is a value (typically an integer between 1 and 99) in terms of percentage. Equivalent levels are designated L_{eq} and quantify a hypothetical steady sound that would have the same energy as the actual fluctuating sound observed. The two sound level metrics that are commonly reported in community noise monitoring are described below.

- L_{90} is the sound level in dBA exceeded 90 percent 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. The equivalent level is designated L_{eq} and is commonly A-weighted. The equivalent level represents the time 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.

15.3.1.2 Noise Regulations

Hand County has not adopted sound level requirements for wind farms and transmission facilities. However, the Applicant has executed a Development Agreement for Hand County, in which the Applicant has committed to limit sound levels from Project wind turbines to 50 dBA at currently occupied residences of participating landowners and 45 dBA at currently occupied residences of non-participating landowners, unless waived in writing by the owner of the occupied residence (Appendix C).

15.3.2 Sound Level Impacts/Avoidance & Mitigation Measures

The results of the sound level modeling conducted for the Project is included in Appendix L. The following sections describe the impacts and the avoidance and mitigation measures for sound from development of the Project.

15.3.2.1 Wind Farm

The wind turbines and substation transformers would be the primary sources of sound from the Wind Farm. Potential construction and operational impacts from the Wind Farm are discussed in the following subsections.

15.3.2.1.1 Construction Sound Levels

The majority of the construction activity related to the Project would occur around each of the wind turbine sites. Full construction activity would generally occur at one wind turbine site at a time, although there would be some overlap at adjacent sites for maximum efficiency. There are generally three phases of construction at a wind energy project – excavation, foundation installation, and turbine erection. Table 15-1 presents the equipment sound levels for the louder pieces of construction equipment expected to be used at this site and the phase of construction during which they would be used.

Table 15-1: Sound Levels for Construction Noise Sources

Phase	Equipment	Sound Level at 50 feet (dBA)
Excavation	Grader	85
Excavation	Bulldozer	82
Excavation	Front-end loader	79
Excavation	Backhoe	78
Excavation	Dump truck	76
Excavation	Roller	80
Excavation	Excavator	81
Excavation	Rock drill	89
Foundation	Concrete mixer truck	79
Foundation	Concrete pump truck	81
Foundation	Concrete batch plant	83
Turbine erection	Large crane #1	81
Turbine erection	Large crane #2	81
Turbine erection	Component delivery truck	84
Turbine erection	Air compressor	78

Source: Sound Level Modeling Report, Appendix L

Construction of the Project is expected to take multiple months. Construction of a single wind turbine from excavation to foundation pouring to turbine erection is roughly a 3-week process. However, work would not proceed in that order for each wind turbine to be erected. For example, all foundations would be poured before any turbine erection work begins. Sound impacts would be reduced by scheduling heavy construction work during daylight hours, to the extent possible. Excavation work is expected to occur from early morning to the evening. Concrete foundation work and turbine erection work could extend into the overnight hours depending on the weather and timing of a concrete pour, which must be continuous. Excavation work would be daytime only. Construction sound would comply with applicable county and State requirements, regulations, and ordinances.

15.3.2.1.2 Operational Sound Levels

The sound level modeling analysis conservatively includes all 86 potential turbine locations, although only up to 71 turbines will be constructed (15 locations are alternate locations). A total of 64 primary and 9 alternate wind turbines are proposed to have a hub height of 114 meters and a total of 7 primary and 6 alternate wind turbines are proposed to have a hub height of 89 meters. The hub height of each wind turbine in the layout is included in Appendix A of the sound analysis. Turbines 42 and 43 (Figure A-2) will be GE 2.82-127 Low Noise Trailing Edge (LNTE) technology. The expected sound power levels associated with the GE 2.82-127 turbine with hub heights of 89 or 114 meters and the expected sound power levels associated with the GE 2.82-127 were obtained from technical reports from GE. The octave-band sound power levels calculated for the GE 2.82/127 and GE 2.82-127 LNTE turbines represent "worst-case" operational sound level emissions.

In addition to the wind turbines, there will be a substation associated with the Project. Two 110 megavolt-ampere (MVA) transformers are proposed for the substation. Octave-band sound power levels were estimated using the MVA rating provided for the transformer and techniques in the Electric Power Plant Environmental Noise Guide (Edison Electric Institute), Table 4.5 Sound Power Levels of Transformers.

The noise impacts associated with the proposed wind turbines were predicted using the Cadna/A noise calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). This software allows a more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of sound from multiple sources as well as computation of diffraction. The inputs and significant parameters employed in the model are described in the Sound Level Assessment Report in Appendix L.

The highest wind turbine sound power level for each wind turbine type plus an uncertainty factor of 2 dBA was input into Cadna/A to model wind turbine generated sound pressure levels during conditions when worst-case sound power levels are expected.

Sound pressure levels for 86 GE 2.82-127 model turbines with either 89- or 114-meter hub heights and the 110-MVA substation transformers were modeled at 41 sensitive receptors (occupied residences) in Hand County. A sound model was first completed using all 86 wind turbines as GE 2.82-127 units with regular blades. Results showed that sound levels at two participating residences would exceed the Hand County Development Agreement limits. The sound modeling was changed to include LNTE technology,

which resulted in the sound levels at the two participating receptors reduced to 50 dBA, which would meet the Hand County Development Agreement limit for participating landowners. The sound levels range from 35 to 50 dBA at participating receptors, is 41 dBA at the pending participation receptor, and range from 27 to 43 dBA at non-participating receptors. The highest modeled sound level at a non-participating residence is 43 dBA. Accordingly, the Project will comply with the Hand County Development Agreement sound limits of 50 dBA at occupied residences of participating landowners and 45 dBA at occupied residences of non-participating landowners, unless waived in writing by the owner of the occupied residence. Modeled sound contours are shown in Appendix L.

15.3.2.2 Transmission Facility

Construction of the Gen-Tie Line would result in sound levels similar to those of the Wind Farm (Section 15.3.2.1.1). Operation of the Gen-Tie Line is not anticipated to be a substantial source of sound.

15.4 Visual Resources

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

15.4.1 Existing Visual Resources

Cropland, pasture, grassland, and large open vistas with gently rolling topography visually dominate the Project Area landscape. Existing structures in the Project Area include 19 occupied residences dispersed throughout (Figure A-2 and Figure A-5), as well as scattered farm buildings. U.S. Route 14 and South Dakota Highway 45 are situated to the north and west of the Project boundary, respectively. The Project Area is generally intersected by 369th Avenue running north/south and multiple township roads crossing the Project Area throughout. WAPA's existing Fort Thompson to Huron 230-kV transmission line traverses the southeastern portion of the Project Area; the transmission line structures along this line are existing vertical elements in the generally horizontal landscape.

Scenic resources with sensitive viewsheds can include national parks, monuments, and recreation areas; national historic sites, parks, and landmarks; national memorials and battlefields; national wild and scenic rivers, national historic trails, national scenic highways, and national wildlife refuges; State- or locally designated scenic resources, such as State-designated scenic highways, State parks, and county parks; and other scenic resources that exist on federal, State, and other non-federal lands. None of these scenic resources with sensitive viewsheds are located within the Project Area or within viewing distance of the Project.

Visual impacts to the landscape attributable to the Project would depend on the extent to which the existing landscape is already altered from its natural condition, the number of viewers (residents, travelers, visiting recreational users, etc.) within visual range of the Project, and the degree of public or agency concern for the quality of the landscape. Travelers through the Project Area would include local or regional traffic along U.S. Route 14 and South Dakota Highway 45.

15.4.2 Visual Impacts/Avoidance & Mitigation Measures

The following sections describe the potential visual impacts from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

15.4.2.1 Wind Farm

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, positively, or neutrally to the changes in the viewed landscape.

Construction, operation, and decommissioning of the proposed Wind Farm would potentially introduce visual contrasts in the Project Area that may cause visual impacts. The types of visual contrasts of concern include the potential visibility of wind turbines and associated facilities such as roads and marker lighting on wind turbines, as well as security and other lighting. Other visual contrasts would include modifications to landforms and vegetation, vehicles associated with transport of workers and equipment for construction, operations, and maintenance, and facility decommissioning, and the construction, operation, maintenance, and decommissioning activities themselves.

The potential visual impacts associated with wind turbine generator structures, aside from the structures themselves, are blade movement and shadow flicker (discussed in Section 15.5). The wind turbine generator structures would create primary visual impacts from the introduction of the numerous vertical lines of the wind turbines into the generally strong horizontal landscape found in the Project Area. The visible structures would potentially produce visual contrasts by their design attributes (form, color, and line) and the reflectivity of their surfaces. In addition, marker lighting would be visible at night when planes are flying overhead (if an ADLS is installed).

For nearby viewers, including the rural residences dispersed throughout the Project Area, the size, geometric lines of the individual turbines, turbine array, and sweep of the moving rotors may draw

attention. Structural details, such as surface textures, may be noticeable, and the O&M facility and other structures could be visible as well.

Measuring the aesthetic value of a specific landscape is difficult and may vary based on an individual's personal values, experiences, or preferences. The degree of visual contrast would vary based on the viewpoint distance and location in relation to the Project. The magnitude of the visual impacts associated with the Wind Farm would depend on certain factors, including:

- Distance of the proposed Wind Farm from viewers;
- Duration of views (highway travelers vs. permanent residents);
- Weather and lighting conditions;
- The intermittent 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 Wind Farm, the Applicant has incorporated State and Hand County Development Agreement setback requirements into the design of the Project (Appendix C). As identified in Table 9-1 (see Section 9.2), turbines would be set back at least 1,320 feet from occupied residences, 1.1 times the wind turbine tip height from maintained county and township roadways, 1.1 times the wind turbine tip height from existing overhead lines, and 500 feet, or 1.1 times the height of the tower from any surrounding property line unless a written agreement is in place with the adjacent landowner allowing closer placement (pursuant to SDCL 43-13-24).

In accordance with FAA regulations, the towers would be painted off-white to reduce potential glare and minimize visual impact. If required by the FAA, the Applicant would install an ADLS on Project turbines. ADLS involves the installation of radar units around the perimeter of the Project. When the radar does not detect an aircraft, it sends a signal to the wind turbine lighting that keeps the light off. When the radar detects aircraft, it stops sending that signal, and the wind turbine lighting activates.

At the end of the Project's operating life, the facility would be decommissioned (see Section 23.0), and all wind turbines, electrical cabling, electrical components, roads, and any other associated facilities would be removed in accordance with applicable State regulations and county agreements, unless otherwise agreed to by the landowner. As such, no visual impacts would remain beyond the operating life of the Project.

There are no scenic resources with sensitive viewsheds located within the Project Area or within viewing distance of the Project. Therefore, no impacts to scenic resources would result from construction or operation of the Project and no mitigation measures are recommended.

15.4.2.2 Transmission Facility

The primary or alternate Gen-Tie Line would introduce vertical lines from the gen-tie structures into the generally strong horizontal landscape within the Project Area. The size and geometric lines of the individual Gen-Tie Line structures and the alignment of the structures may draw viewer attention. The impacts would be similar to those of existing distribution and transmission lines.

The Gen-Tie Line structures have been sited to minimize potential visual impacts of the Gen-Tie Line within the Project Area. The preferred route has been sited to minimize length and number of structures and away from residences to minimize visual impacts. The alternate route has been sited along existing roadways and along property lines where no roadways exist. Both routes take as direct a route as feasible from the Project substation to the point of interconnection to minimize impacts. Conductor used for the Gen-Tie Line would be composed of non-reflective material, making the conductor less visible to viewers in the area. Steel monopoles, if used, would be painted with non-reflective paint to reduce visual contrast and reflection in the environment.

15.5 Shadow Flicker

A shadow flicker modeling study was performed for the Project. The modeling results are included in Appendix M. The results of the shadow flicker modeling study within the Project Area are described below, followed by a discussion of the potential effects of shadow flicker from the proposed Project's operation, and mitigation, avoidance, and minimization measures for shadow flicker.

15.5.1 Shadow Flicker Overview and Regulatory Framework

With respect to wind turbines, shadow flicker can be defined as an intermittent change in the intensity of light in a given area resulting from the operation of a wind turbine when wind turbine blades pass in front of the sun to create recurring shadows on an object. For shadow flicker to occur, the wind turbine must be operating, the sun must be shining, and the window must be within the shadow region of the wind turbine, otherwise there is no shadow flicker. While indoors, an observer experiences repeated changes in the brightness of the room as shadows cast from the wind turbine blades briefly pass by windows as the blades rotate. The intensity of shadow flicker varies significantly with distance, and as separation between a turbine and receptor increases, shadow flicker intensity correspondingly diminishes. A stationary wind turbine only generates a stationary shadow similar to any other structure.

Shadow flicker was modeled using a software package, WindPRO version 3.2.737. WindPRO is a software suite developed by EMD International A/S and is used for assessing potential environmental impacts from wind turbines. Using the Shadow module within WindPRO, worst-case shadow flicker in the area surrounding the wind turbines was calculated based on data inputs, including location of the wind turbines, location of discrete modeling points, wind turbine dimensions, shadow flicker calculation distance limits, and terrain data. Based on these data, the model was able to incorporate the appropriate sun angle and maximum daily sunlight for this latitude into the calculations. The resulting worst-case calculations assume that the sun is always shining during daylight hours and that the wind turbine is always operating. The WindPRO Shadow module can be further refined by incorporating sunshine probabilities and wind turbine operational estimates by wind direction over the course of a year. The values produced by this further refinement, also known as the "expected" shadow flicker, are presented in the report.

WindPRO was used to calculate shadow flicker at the 41 occupied residences in Hand County and to generate shadow flicker isolines based on the grid calculations (see Appendix M). The shadow flicker modeling analysis conservatively included the 71 proposed primary wind turbine locations as well as the 15 proposed alternate turbine locations. The inputs and significant parameters employed in the model are described in the Shadow Flicker Analysis Report in Appendix M.

Shadow flicker impacts are not currently regulated in applicable local, State, or federal law. However, the Applicant's Development Agreement with Hand County limits shadow flicker resulting from Project wind turbines at currently occupied residences to 30 hours per year or less, unless waived in writing by the owner of the occupied residence.

15.5.2 Shadow Flicker Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts from shadow flicker due to development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

15.5.2.1 Wind Farm

The shadow flicker modeling results included in Appendix M. Shadow flicker from 86 wind turbines (GE 2.82-127 turbine model) with either 89- or 114-meter hub heights were estimated. The model included a total of 41 occupied receptors. Utilizing the conservative modeling parameters, the shadow flicker modeling results indicate that the maximum expected annual flicker at a non-participating receptor is 9 hours, 16 minutes. The maximum expected annual flicker at a receptor with pending participation is 14 hours, 49 minutes. The maximum expected annual flicker at a participating receptors is 55 hours, 23

minutes. The modeling indicates that four participating residences in Hand County could experience annual shadow flicker levels above 30 hours per year. In accordance with the Hand County Development Agreement for the Project, written waivers will be acquired for these receptors prior to construction. Therefore, the Project would meet the requirements with respect to shadow flicker in the Development Agreement.

15.5.2.2 Transmission Facility

The Gen-Tie Line does not have moving parts that would generate shadow flicker.

15.6 Electromagnetic Interference

There is the potential for communication systems to experience disturbances from electric feeder and transmission and communication lines associated with wind farms. The existing telecommunication, navigation, and radar systems within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project's construction and operation, and mitigation and minimization measures.

15.6.1 Existing Communications Systems

To document existing communications systems in the Project Area, several studies were performed for the Project: AM and FM radio report, off-air TV analysis, microwave point-to-point path analysis, obstruction evaluation and airspace analysis, and National Telecommunication Information Agency (NTIA) notification. The results of those studies are discussed in the following subsections, and the studies are included in Appendix N.

15.6.1.1 AM and FM Radio

There are four database records for identified AM stations within approximately 50 kilometers of the Project. These records represent two distinct stations, KIJV and KOKK, which broadcast out of Huron, South Dakota, east of the Project. The exclusion distance for AM broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the lesser of 10 wavelengths or 3 kilometers. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from wind turbine towers. The closest operational AM station to the Project, KIJV, is more than 42.6 kilometers from the nearest wind turbine.

There are nine database records of FM stations within approximately 50 kilometers of the Sweetland Wind Farm project. Only six of these stations are currently licensed and operational, four of which are translators that broadcast with limited range.

15.6.1.2 Television

Television stations within 150 kilometers are the most likely to provide off-air coverage to the Project Area and neighboring communities. Database records included 77 stations within approximately 150 kilometers of the limits of the Project Area. Only 33 of these stations are currently licensed and operating, 24 of which are low-power stations or translators. Translator stations are low-power stations that receive signals from distant broadcasters and retransmit the signal to a local audience; these stations have limited range.

15.6.1.3 Microwave Links

Microwave networks are important telecommunication infrastructure, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. A microwave obstruction analysis was performed to identify all non-government licensed, proposed, and applied microwave paths that intersect the Project region (an area that includes the Project Area) (Appendix N; Scout Clean Energy, 2019).

The study found one microwave path approximately 7 miles southwest of the Project. A Fresnel Zone was calculated for the microwave path. In general, a Fresnel Zone is defined by the cylindrical area whose axis is the direct line between the microwave link endpoints. This is the zone where the siting of obstructions should be avoided. Both the microwave path and associated Fresnel Zone run diagonally northwest-southeast approximately 7 miles outside the Project Area, as shown in the Figures 2 and 3 in the Microwave Study included in Appendix N of this application. The study indicates that the Project Area would not penetrate the microwave Fresnel Zones.

15.6.1.4 Radar Surveillance Systems

Radar systems support air traffic control operations as well as weather detection. Wind turbines within radar line of sight (RLOS) are “visible” to radars and could create unwanted clutter resulting in false radar returns and decrease in radar sensitivity. This would be a potential safety hazard. The Obstruction Evaluation and Airspace Analysis prepared for the Project (Appendix N) provided a preliminary RLOS analysis for three radar surveillance systems: Gettysburg (Common Air Route Surveillance Radar), Aberdeen (Weather Surveillance Radar Model 1988 Doppler), and Sioux Falls (Weather Surveillance

Radar Model 1988 Doppler). The proposed GE 2.82/127 turbine model at 114-meter hub height would be 584 feet above ground surface, and the analysis determined that structures 584 feet above ground surface would not be visible to these three systems. Structures Thus, the preliminary RLOS analysis indicates that the proposed turbines would not be visible to any air traffic control, air defense, homeland security, or weather radar sites.

15.6.1.5 National Telecommunication Information Administration

Operation of radio frequencies for federal government use is managed by the NTIA, which is part of the U.S. Department of Commerce. The technical specifications for most government facilities are unavailable to the public. The NTIA has developed a review process wherein the Interdepartmental Radio Advisory Committee (IRAC), consisting of representatives from various government agencies, reviews new proposals for wind turbine projects for impact on government frequencies. On May 4, 2017, a notification of the Sweetland Wind Farm Project was sent to the NTIA, and in a letter dated July 12, 2017, the NTIA indicated that the IRAC did not identify any concerns regarding radio frequency blockage. A copy of the NTIA letter is included in Appendix N.

15.6.2 Communications Systems Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts from interference due to development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

15.6.2.1 Wind Farm

No AM radio stations were found within 3 kilometers of the Project, which is the maximum possible exclusion distance based on a directional AM antenna broadcasting at 1000 KHz or less, so the Project should not impact the coverage of local AM stations.

The coverage of FM stations is generally not susceptible to interference caused by wind turbines, especially when large objects, such as wind turbines, are sited in the far field region of the radiating FM antenna to avoid the risk of distorting the antenna's radiation pattern. However, within a station's near field, radiation pattern distortion can become a factor. Signal attenuation is also possible but is difficult to quantify without precise field measurements. The closest FM station to the Project, KVCH, is more than 38.7 kilometers from the nearest turbine, which should provide adequate separation to avoid radiation pattern distortion.

Based on a contour analysis of the licensed television stations within 150 kilometers of the Project, five of the full-power digital stations could potentially have their reception disrupted in and around the Project. The areas primarily affected would include television service locations within 10 kilometers of the Project

that have clear line-of-sight to a proposed wind turbine but not to the respective station. After the wind turbines are installed, communities and homes in these locations may have degraded reception of these stations. This is due to multipath interference caused by signal scattering as television signals are reflected by the rotating wind turbine blades and mast.

Modern digital television receivers have undergone significant improvements to mitigate the effects of signal scattering. When used in combination with a directional antenna, it becomes even less likely that signal scattering from wind farms will cause interference to digital television reception. Nevertheless, signal scattering could still impact certain areas, especially those that would have line-of-sight to at least one wind turbine but not to the television station antenna.

The Applicant is committed to avoiding and/or minimizing impacts to television reception by implementing the following measure:

- Any disruptions to over-the-air television viewing caused by the Project will be resolved, at Sweetland's expense, by relocating the household antenna to receive a better signal, installation of a better outside antenna or one with higher gain, or installation of satellite or cable television. Sweetland shall take appropriate actions to minimize any such interference and shall make a good faith effort to restore or provide reception levels equivalent to reception levels in the immediate areas just prior to construction of the Project. This mitigation requirement shall not apply to any dwellings or other structures built after completion of the Project.

No microwave paths or associated Fresnel Zones overlie the Project Area. The Applicant has sited wind turbines such that they would not impact any air traffic control, air defense, homeland security, or weather radar sites. The IRAC did not identify any concerns regarding radio frequency blockage. Thus, the Wind Farm would not interfere with these existing communications systems.

15.6.2.2 Transmission Facility

The Gen-Tie Line and associated facilities would be located within the Project Area, and the Gen-Tie Line structures would be a maximum of 110 feet tall (single pole tangent structure) or 75 feet tall (H-frame tangent structure), depending on which structure type is selected. Therefore, the Gen-Tie Line structures also would not interfere with these existing communications systems.

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

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

The Project would be constructed on farming and ranching land in Hand County, South Dakota. Land use in Hand County is regulated by the Hand County Zoning Ordinance. Hand County's ordinance does not include regulations specific to wind energy systems, but does require a Conditional Use Permit for the Project's substation and switchyard. Additionally, the Applicant has entered into a Development Agreement with Hand County and has designed the Project to meet the setback, shadow flicker, and noise requirements set forth in Agreement (Appendix C).

Following receipt of Energy Facility Permits, the Applicant will apply for a Conditional Use Permit from Hand County for the Project substation and switchyard. The Applicant will comply with all terms and conditions of the Conditional Use Permit and also plans to enter into a Road Haul Agreement with the county and affected townships governing the use, improvement, repair, crossing with Project infrastructure, and restoration of roads within the county, as needed. In addition, the Applicant will obtain from each road authority any road crossing, approach, and/or utility permits required for the Project.

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

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

Groundwater and surface water resources are discussed in Section 12.0. As discussed in Section 12.2.2, the excavation and exposure of soils during the construction of wind turbines, Gen-Tie Line structures, access roads, underground collection lines, and other Project facilities could cause sediment runoff during rain events which could impact water quality. However, erosion and sediment control BMPs would keep sediments onsite that might otherwise increase sediment loading in receiving waters.

Construction of the Project would require coverage under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR. A condition of this permit is the development and implementation of a SWPPP. The SWPPP would be developed during civil engineering design of the Project and would prescribe BMPs to control erosion and sedimentation. The BMPs may include use of silt fence, wattles, erosion control blankets, temporary storm water sedimentation ponds, re-vegetation, or other features and methods designed to control storm water runoff and mitigate erosion and sedimentation. The BMPs would be implemented to reduce the potential for impacts to drainage ways and streams by sediment-laden runoff. Because erosion and sediment control would be in place for construction of the Project, impacts to water quality are expected to be negligible.

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

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

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

18.1 Existing Air Quality

The entire State of South Dakota is in attainment for all NAAQS criteria pollutants (EPA, 2018c). The nearest ambient air quality monitoring site to the Project Area is located in Pierre, approximately 70 miles west of the Project Area (EPA, 2018d). The primary emission sources that exist within the Project Area include agricultural-related equipment and vehicles traveling along roads.

18.2 Air Quality Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to air quality from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

18.2.1 Wind Farm

During construction of the Wind Farm, fugitive dust emissions would temporarily increase due to truck and equipment traffic in the Project Area. Additionally, there would be short-term emissions from diesel trucks and construction equipment onsite. Temporary minor sources of air pollution emissions from Project construction equipment, such as a concrete batch plant, would be permitted by the balance-of-plant contractor or concrete batch plant operator through the SDDENR. However, air quality effects caused by dust or vehicle emissions would be short-term, limited to the time of construction, and would not result in any NAAQS exceedances for criteria pollutants.

Potential complaints regarding fugitive dust emissions would be addressed through implementation of BMPs to suppress fugitive dust emissions during construction, such as spraying roads with water, covering open haul trucks when transporting material that can be windblown, and removal of soil or mud deposited by construction equipment.

Operation of the Project would not produce air emissions that would impact the surrounding ambient air quality. Decommissioning of the Project would temporarily increase emissions similar to those from Project construction. The Project would not result in a violation to federal, State, or local air quality standards.

18.2.2 Transmission Facility

Construction of the Gen-Tie Line would result in air emissions similar to those from construction of the Wind Farm. The operation of the Gen-Tie Line would not produce air emissions that would impact the surrounding ambient air quality. The Project would not result in a violation to federal, State, or local air quality standards.

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

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

The Applicant expects to have the Project operational by December 31, 2020. A preliminary permitting and construction schedule is included in Table 19-1.

Table 19-1: Preliminary Permitting and Construction Schedule

Milestone[a]	Start Date	Completion Date
Land acquisition	Q4 2016	Q1 2019
Environmental studies	Q2 2017	Q2 2019
Hand County Development Agreement	Q3 2017	Q4 2018
SDPUC wind Energy Facility Permits process	Q1 2019	Q3 2019
Hand County Conditional Use Permit process (substation and switchyard)	Q3 2019	Q4 2019
WAPA National Environmental Policy Act process	Q1 2019	Q3 2019
Project construction	Q4 2019	Q4 2020
Commercial operation	--	Q4 2020

(a) SDPUC = South Dakota Public Utilities Commission, WAPA = Western Area Power Administration

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

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

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

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

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

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

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

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

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

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

20.1 Socioeconomic and Community Resources

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

20.1.1 Existing Socioeconomics

The Project Area is located in central South Dakota in Hand County. The 2017 population estimate for Hand County was 3,303 (U.S. Census Bureau, 2017b). Miller, with an estimated 2017 population of 1,481, is the largest city in Hand County (U.S. Census Bureau, 2017b). Miller is located approximately 7 miles northwest of the Project Area. The estimated population of Miller and other communities in Hand County, and their distances from the Project Area, are shown in Table 20-1.

Table 20-2 lists key measures of economic development in Hand County and in South Dakota as a whole. Median income in Hand County is slightly lower than the median income in the State. The 2017 unemployment rate in Hand County (2.5 percent) was also lower than that of South Dakota (3.3 percent) (South Dakota Department of Labor and Regulation [SDDLR], 2018).

Table 20-1: Populations of Hand County Communities and Distance from Project Area (2017)

Community	2017 Population Estimate	Distance and Direction from Project Area
Miller	1,481	7 miles northwest
St. Lawrence	152	6 miles northwest
Ree Heights	80	16 miles northwest
Wessington (includes Hand and Beadle Counties)	309	5 miles east

Source: U.S. Census Bureau, 2017b

Table 20-2: Key Measures of Economic Development

Economic Development Measures (Year)	Hand County	South Dakota
Employment (2017)[a]	1,777	455,175
Unemployment rate (2017)[a]	2.5%	3.3%
Median household income (2017)[b]	$50,720	$54,126
State sales tax revenue (2017)[c]	--	$2.0 billion
Population (2017)[d]	3,277	869,666
Rental vacancy rate (2017)[b]	1.9%	5.4%
State and local government expenditures (2012)[e]	--	$6.9 million
State and local government employment (2016)[b]	205	65,727
State recreation sector income (2006)[f]	--	$763 million

(a) SDDLR, Labor Force, Employment and Unemployment for 2017
(b) U.S. Census Bureau, American Community Survey 5-Year Estimates 2013-2017, 2017a
(c) SDDOR, Annual Report, 2017
(d) U.S. Census Bureau, Annual Estimates of the Resident Population, 2017b
(e) U.S. Census Bureau, Census of Governments, 2012
(f) WAPA and USFWS, 2015

In Hand County, the top industries in terms of employment in 2016 were: (1) agriculture, forestry, fishing and hunting, and mining (26.3 percent); (2) educational services, and health care and social assistance (20.5 percent); and (3) retail trade (9.4 percent) (U.S. Census Bureau, 2016).

Table 20-3 summarizes minority and low-income populations data in Hand County and in South Dakota. The population in Hand County in 2017 was mostly white, not Hispanic (96.8 percent). In 2017, an estimated 10.5 percent of the population was below the poverty level. In South Dakota, a smaller proportion of the population was white and not Hispanic (82.2 percent), and a slightly higher percent (13.0 percent) of the population was below the poverty level. The largest minority group in both Hand County and South Dakota is American Indian/Alaska Native (as race alone or in combination with one or more races).

Table 20-3: Minority and Low-Income Populations (2017)

Location	Total Population[a]	Percent Minority[a, b]	Percent Below Poverty[c]
Hand County	3,277	3.2%	10.5%
South Dakota	869,666	17.8%	13.0%

Source: U.S. Census Bureau, 2017a
(a) U.S. Census Bureau data from July 1, 2017
(b) Minority is calculated by adding the populations for all non-white races and the population for white-Hispanic.
(c) 2017 Small Area Income and Poverty Estimates (SAIPE)

20.1.2 Socioeconomic Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to economics, population and housing, and property values from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

20.1.2.1 Wind Farm

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

Construction and operation of a typical wind farm results in the injection of millions of dollars into the local economy both immediately and throughout the life of the Project. These investments would be provide benefits throughout the community, including at hotels, restaurants, gas stations, auto repair companies, tire companies, grocery stores, and other local businesses. During construction, a typical 200-MW wind project, such as the proposed Project, typically generates an immediate need for up to 200 temporary construction jobs over 12 months equaling approximately 400,000 to 420,000 labor-hours to support Project construction. The construction crews would include skilled labor, such as foremen, carpenters, iron workers, electricians, millwrights, and heavy equipment operators, as well as unskilled laborers. During operation, the facility would employ approximately eight to ten full-time personnel as facility managers, site managers, and turbine technicians.

There is the potential for residents within 60 or more miles from the Project Area to take advantage of employment opportunities during Project construction. During construction, non-local workers would relocate to the area, resulting in a temporary increase in population. These non-local construction workers

would need temporary housing. Temporary housing for workers would likely include available facilities at several towns throughout the area, with larger towns, such as Miller, likely having more available facilities.

The proposed Wind Farm could increase demand on the local labor force and for local housing during construction; however, the construction period is only temporary. Overall, the Applicant anticipates the Project would be socioeconomically beneficial to the local population and would not impact long-term population trends.

Over the expected 35-year life of the Project, the Project would generate approximately $78.6 million in direct economic benefits for local landowners, new local employees, local communities, and the State of South Dakota, as outlined in Table 20-4. Further benefits that are not quantified below include local spending on O&M needs such as automotive repair, tires, and gas.

Table 20-4: Direct Economic Benefit from the Sweetland Wind Farm

Payment	Direct Beneficiary	Approximate Total[a]
Wind Lease payments	Project landowners	$21.0 million
Operations and maintenance	~10 employees	$22.5 million
Taxes	Townships, counties, school districts, and South Dakota	$35.1 million

(a) Assumes construction of an approximately 200 MW facility with 71 wind turbines and 35-year Project life.

The Applicant would pay more than $35 million in taxes on the Wind Farm over the anticipated 35-year life of the Project, which would significantly increase the revenue available for a variety of local needs. Tax revenues are apportioned to the separate townships and school districts in the Project Area according to the number of wind turbines located within each jurisdiction, assuming construction of the 71 primary wind turbine locations. A breakdown of this tax information over 35 years is shown in Table 20-5.

Table 20-5: Estimated Tax Revenue for the Sweetland Wind Farm Project

Recipient	Wind Turbines Sited in Boundary (71 Primary Locations)	Approximate Annual Tax Revenue[a,b,c]	Approximate Total Tax Revenue[a,b,d]
South Dakota	71	$322,000	$11,284,000
Hand County	71	$238,000	$8,337,000
Pearl Township	40	$58,000	$2,013,000
Hulbert Township	27	$39,000	$1,359,000
Rose Hill Township	4	$6,000	$201,000

Recipient	Wind Turbines Sited in Boundary (71 Primary Locations)	Approximate Annual Tax Revenue[a,b,c]	Approximate Total Tax Revenue[a,b,d]
Wessington School District	10	$48,000	$1,678,000
Miller School District	61	$292,000	$10,233,000
Total	**--**	**$1,003,000**	**$35,105,000**

Source: Sweetland Wind Farm, LLC, January 2019
(a) Assumes construction of 71 primary wind turbine locations.
(b) Taxes apportioned by the Hand County Auditor by 50 percent to school districts, 15 percent to townships, and 35 percent to the county. Taxes further apportioned according to the number of wind turbines located in each township and each school district.
(c) After the fifth year of receiving the total annual tax revenue as well as South Dakota State-aid funds for the school districts, the amount of the wind energy tax revenue that is considered local effort funding would increase by 20 percent each year until year 10, after which all wind energy tax revenue would be considered local effort funding in the South Dakota School Funding Formula, which may decrease the State-aid funds the school districts receive. However, as shown in the table, 100 percent of the wind tax revenue allocated to the school districts would still be received by the school districts.
(d) Assumes 35-year Project life.

No impacts to property values are anticipated from the Project. Prior studies have found that large-scale wind energy facilities do not have a negative impact on the value of agricultural properties that host wind turbines or on rural residential or agricultural properties surrounding wind facilities (Hoen et al., 2009; Hoen et al., 2013; MaRous & Company, 2018). Based on these studies, the Commission 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 Commission 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, Para. 60 (June 12, 2018).

20.1.2.2 Transmission Facility

During construction, the up to 7-mile Gen-Tie Line would generate an immediate need for up to 30 temporary construction jobs over 12 months. These construction jobs would be part of the 200 construction jobs previously described for the Wind Farm. During operation, the Project would not separately employ personnel for the Gen-Tie Line.

Employment opportunities and potential local population effects generated during construction of the selected Gen-Tie Line route would be similar to that of the Wind Farm, although to a lesser extent. Overall, the Applicant anticipates the Gen-Tie Line would be socioeconomically beneficial to the local population and would not impact long-term population trends. Therefore, no mitigation measures are anticipated to be required.

The impact of transmission lines on property values has also been reviewed in the literature. Jackson and Pitts (2010) 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 (2 to 9 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.

20.2 Commercial, Industrial, and Agricultural Sectors

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

20.2.1 Existing Agricultural Sector

The Project Area is predominantly agricultural, consisting of a mix of cropland, hayland, and rangeland and pastureland. In 2012, Hand County's 415 farms (totaling 905,141 acres of land) produced $284.4 million in agricultural products (USDA, 2012a). Thirty percent was from livestock sales, and 70 percent was from crop sales. Cattle and calves were the top livestock inventory item in the county, and soybeans for beans was the top crop in terms of acreage. Hand County ranked 6 out of the 66 South Dakota counties in total value of agricultural products sold (USDA, 2012a).

20.2.2 Agricultural Impacts/Avoidance & Mitigation Measures

The following sections describe the potential impacts to agriculture from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

20.2.2.1 Wind Farm

Minimal existing agricultural land would be taken out of crop and forage production by the proposed Wind Farm. Land taken out of production would primarily be around wind turbine foundations, access roads, permanent meteorological towers, and the electric collection and interconnection facilities.

Landowners would be compensated by the Applicant for losses to crop production during construction. These landowners would also benefit in the form of lease payments based on wind lease agreements which would compensate for Wind Farm facilities located on agricultural land. Lease payments made by the Applicant would provide steady income for agricultural landowners, diversifying their sources of income. Agricultural activities can occur up to the edge of access roads and turbine pads. The buried underground collection lines would not alter agricultural activities.

Development of the Wind Farm would impact approximately 356.3 acres of agricultural land temporarily during construction and 39.4 acres of agricultural land during operation of the Project (less than 0.2 percent of the total land within the Project Area). This acreage is calculated assuming all 86 wind turbine locations. Areas disturbed due to construction and that would not host Project facilities would be re-vegetated with vegetation types matching the surrounding agricultural landscape.

20.2.2.2 Transmission Facility

The Gen-Tie Line would minimally impact existing agricultural land. Crop and forage production would be removed primarily in areas where the selected Gen-Tie Line structures would be located. Agricultural activities could occur up to the edge of the temporary access roads and temporary Gen-Tie Line structure work areas. Furthermore, landowners would receive easement payments and would be compensated by the Applicant for losses to crop production incurred during construction.

The Gen-Tie Line route would remove up to 51.7 acres of agricultural land temporarily due to construction activities and up to 0.01 acre for permanent Gen-Tie Line structures. The agricultural land removed from production represents a small fraction of the total land within the Project Area.

20.3 Community Facilities and Services

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

20.3.1 Existing Community Facilities and Services

Most community facilities and services near the Project Area are located in the towns of Miller and Wessington, which are approximately 7 miles northwest and 5 miles northeast of the Project Area, respectively. Miller contains a hospital, police, fire and ambulance services, schools, places of worship, and parks and recreational facilities. Wessington does not have police, hospital, or school facilities; those services would be available in the nearby towns of Miller, Wolsey, or Huron. Wessington contains a volunteer fire department, ambulance services, a church, and recreation area. No community facilities are located within the Project Area.

Electrical service in the Project Area is provided by Miller Municipal Electric and Central Electric Cooperative. The Mid-Dakota Rural Water System supplies rural water to the Project Area and maintains a network of distribution lines within the Project Area.

20.3.2 Community Facilities and Services Impacts/Avoidance & Mitigation Measures

The following sections describe the potential community facilities and services impacts from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

20.3.2.1 Wind Farm

The additional workers moving into the region during construction of the proposed Wind Farm could temporarily add an additional demand on some of the existing community facilities and services. However, this demand would be temporary, and it is anticipated that the existing facilities would have sufficient capacity to meet this demand. During Project operation, running water in the O&M facility would be provided by the existing water distribution lines or by an onsite well (see Section 12.3.2.1).

The proposed Wind Farm is located within a rural portion of Hand County. During the construction period and during subsequent operation, it is expected that the Wind Farm would have no significant impact on the security and safety of the local communities and the surrounding area. Some additional risk for workers or public injury may exist during the construction phase, as it would for any large construction project. However, work plans and specifications would be prepared to address worker and community safety during Wind Farm construction.

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

During Wind Farm operations, the Wind Farm operator would coordinate with local and county emergency management to protect the public and the property related to the Wind Farm during natural, manmade, or other incidents. The Applicant would register each turbine location and the O&M facility with the rural identification/addressing (fire number) system and 911 systems.

20.3.2.2 Transmission Facility

Potential effects on existing community facilities and services from development of the Gen-Tie Line would be similar to those of the Wind Farm. The Gen-Tie Line would create temporary additional demand on community facilities and services, but it is anticipated there would be sufficient capacity to meet this demand.

20.4 Transportation

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

20.4.1 Existing Transportation

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

20.4.1.1 Surface Transportation

Table 20-6 lists the major roads that intersect the Project Area. The primary access to the Project Area is via U.S. Route 14, located north of the Project Area boundary; Vayland Road/369th Avenue/County Road 9, which intersects the central portion of the Project Area from north to south; and 208th Street, which intersects the Project Area east to west (Figure A-1). Secondary access to turbine locations would be via existing county and township gravel roads. Roads would be assessed for strength and condition prior to construction. County and township gravel roads determined to be insufficient for construction use would be upgraded and strengthened prior to, and maintained during, construction at the Applicant's expense. Paved roads would be returned to pre-construction or better condition if damage occurs. The Applicant would enter into a Road Haul Agreement (a.k.a., road use agreements) with each road authority, as required, to define use and restoration of roads utilized during construction of the Project.

Table 20-6: Project Area Roads

Road	Surface Type	Surface Width	Total Lanes
366th Avenue	Gravel or crushed rock	10 to 22 feet	1 to 2
369th Avenue/Vayland Road/County Road 9	Bituminous, gravel or crushed rock	26 feet	2
205th Street	Gravel or crushed rock	28 feet	2
208th Street	Gravel or crushed rock	16 to 28 feet	1 to 2
210th Street	Gravel or crushed rock	10 to 26 feet	1 to 2

Source: SDDOT, 2017a

SDDOT provides Average Daily Traffic (ADT) data for 2017 from two locations within the Project Area. The first location was at 208th Street between 369th Avenue and 372nd Avenue, with an ADT count of 37. At the second location at 205th Street between 365th Avenue and 366th Avenue, the 2017 ADT was 32. Additionally, there was one 2017 SDDOT ADT traffic count location north of the Project Area boundary at the intersection of 369th Avenue between 200th Street and U.S. Route 14; this location is at the Project's primary access point and had an ADT count of 83 (SDDOT, 2017a). The major highways surrounding the Project Area include U.S. Route 14 and South Dakota Highway 45, which had 2017 ADT counts ranging from 551 to 1,500 and 251 to 550, respectively (SDDOT, 2017b).

20.4.1.2 Aviation

No airports, private airstrips, or private helipads are located within the Project Area. The closest airports are Miller Municipal Airport, approximately 6 miles northwest of the Project Area, and Huron Regional Airport, approximately 26 miles east of the Project Area. An evaluation of private-use airports found that the closest private airport to the Project Area is more than 17 nautical miles from the Project Area. No private-use or unregistered airstrips were identified in proximity to the Project Area (Capitol Airspace Group, February 2019; Appendix N). Military airspace and training routes do not overlie the Project Area, as determined in the Obstruction Evaluation and Airspace Analysis prepared for the Project (Appendix N). The nearest U.S. air military installation is Ellsworth Air Force Base, located approximately 210 miles west of the Project Area. The nearest South Dakota Air National Guard installation is the 114th Fighter Wing, located approximately 115 miles southeast of the Project Area at Joe Foss Field Base in Sioux Falls, South Dakota. Air traffic may be present in the Project Area for crop dusting of agricultural fields.

An Obstruction Evaluation and Airspace Study (Appendix N) was prepared for the Project Area to identify obstacle clearance surfaces established by the FAA that could limit the placement of wind turbines. 14 CFR Part 77.9 requires that all structures exceeding 200 feet above ground level be submitted to the FAA so that an aeronautical study can be conducted. The end result of an aeronautical study is the issuance of a determination of "hazard" or "no hazard" that can be used by the Applicant to obtain necessary local construction permits.

The Obstruction Evaluation and Airspace Study identified potential constraints in the Study Area. The FAA uses level and sloping imaginary surfaces to determine obstructions to air navigation, and the Miller Municipal Airport's 14 CFR Part 77 imaginary surfaces overlay the northwestern corner of the Project Area. Also, obstacle clearance surfaces associated with instrument approach or departure procedures for Miller Municipal Airport and Huron Regional Airport overlay the Project Area and range from 2,000 to

2,840 feet AMSL. In addition, USGS elevation data indicates that instrument approach procedures could limit placement of the wind turbines in a small southeastern section of the Project Area and also limit placement of the 114-meter hub height wind turbines on higher terrain in eastern sections of the Project Area. Height constraints and above ground level clearance maps are included as Figures 13 and 14 in the Obstruction Evaluation and Airspace Study (Appendix N).

20.4.2 Transportation Impacts/Avoidance & Mitigation Measures

The following sections describe the potential ground transportation and air traffic impacts from development of the Wind Farm and the Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

20.4.2.1 Wind Farm

The Project Area contains no major highways, one paved two-lane county road, and multiple county and township gravel roads. The primary access to the Project Area is via U.S. Route 14, Vayland Road/369th Avenue/County Road 9, and 208th Street. During construction, it is anticipated that several types of light, medium, and heavy-duty construction vehicles would travel to and from the site, as well as private vehicles used by the construction personnel. Construction hours are expected to typically be 6:00 A.M. to 9:00 P.M. on weekdays. In the event of construction delays due to weather (e.g., late snowfall, high wind days, etc.), or the need to complete an activity (e.g., pouring a turbine foundation or flying a rotor), construction on some weekends and nights may be required to meet the overall proposed Project schedule. The movement of equipment and materials to the site would cause a relatively short-term increase in traffic on local roadways during the construction period. Most equipment (e.g., heavy earth-moving equipment and cranes) would remain at the site for the duration of construction activities. Shipments of materials, such as gravel, concrete, and water, would not be expected to substantially affect local primary and secondary road networks. That volume would occur during the peak construction time when most of the foundation and tower assembly is taking place. At the completion of each construction phase, this equipment would be removed from the site or reduced in number, and replaced with equipment for the next phase, as appropriate.

The Wind Farm would not result in any permanent impacts to the area's ground transportation resources. There would be improvements to most gravel roads and temporary impacts to local roads during the construction phase of the Wind Farm. The Applicant would work with the townships and Hand County on road use agreements so that all parties understand how the construction process would proceed prior to commencement. Oversized and overweight loads would be strictly confined to roads designated in the road use agreement for the Wind Farm. The Applicant would work with SDDOT, Hand County, and the

local townships in the area to obtain the appropriate access and use permits and to reduce and mitigate the impacts to area transportation.

An Obstruction Evaluation and Airspace Study (Appendix N) prepared for the Project Area identified potential constraints to Project development. The Applicant has sited Project facilities to avoid potential impacts to airspace. The Applicant submitted Form 7460-1, Notice of Proposed Construction or Alteration with the FAA for each turbine location in February 2017, assuming the GE 2.5/127 turbine with an 89-meter hub height option. The FAA issued Determination of No Hazard for the preliminary layout. Since that time, the Project has been revised to a new turbine model, GE 2.82/127, with a 114-meter hub height. New Forms 7460-1 were filed on February 14, 2019, for the new turbine array. As required, the Applicant expects a Determination of No Hazard would be issued for the finalized layout, and the Project would comply with applicable FAA requirements. As required, the Applicant would also file Tall Structures Aeronautical Hazard Applications with the South Dakota Aeronautics Commission for a permit approving the proposed wind turbine and permanent meteorological tower locations.

In addition, the installation of wind turbine towers in active croplands would create potential hazards for crop-dusting aircraft. However, crop dusting is typically carried out during the day by highly maneuverable airplanes or helicopters. Also, the turbines and meteorological tower(s) would be visible from a distance, similar to existing transmission/distribution line structures (typically located along the edges of fields and roadways). It is anticipated pilots operating in the area would become accustomed to the location and visibility of the wind turbine towers and would maneuver around them.

20.4.2.2 Transmission Facility

During construction of the Gen-Tie Line, the same roadways would be used to access the Project Area and impacts to ground surface transportation would be similar to those of the Wind Farm.

The Gen-Tie Line would not impact air traffic from the identified airports in the surrounding area. It is possible local air traffic in the form of crop dusting of agricultural fields carried out during the day by highly maneuverable airplanes or helicopters may be present near the Gen-Tie Line. The aboveground Gen-Tie Line structures and conductors would create potential hazards to crop dusting aircraft but due to the short length of the Gen-Tie Line routes and the minimal crop-dusting activities within the Project Area, the risk is expected to be minimal.

20.5 Cultural Resources

The Applicant conducted a Level III intensive cultural resources survey for all areas that would be physically impacted by the Project (direct APE) as well as a Historic Architectural Resources

Reconnaissance Survey to document historic-age non-archaeological resources within a larger indirect APE extending 3 miles from the Project footprint. The Historic Architectural Resources Reconnaissance Survey focused on documenting standing historic-era (pre-1973) buildings, structures, objects, districts, etc. to assess both their significance and the Project's potential to adversely affect significant resources' 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 following sections provide information on the cultural resources potentially affected by the construction, operation, and maintenance of Project facilities and describes how impacts to these resources would be avoided and/or minimized. The cultural resources report prepared for the Project is included as Appendix O.

20.5.1 Existing Cultural Resources

This section describes the existing cultural resources within the Study Area.

20.5.1.1 Regulatory Framework

SDCL 1-19A-11.1 requires that State agencies or political subdivisions of the State, or any instrumentality thereof (i.e., county, municipality, etc.) may not undertake any project that will encroach upon, damage, or destroy any historic property included in NRHP or State registers until the SHPO has been given notice and an opportunity to investigate and comment on the proposed project. Any permits required by the State, county, or municipalities, including an SDPUC Energy Facility Permit, will invoke this law.

ARSD 20:10:22:23 states that an application for an Energy Facility Permit shall include a forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance.

Furthermore, as part of the NEPA process for approval of the WAPA interconnection, the Project will require compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. As such, the Applicant is coordinating with WAPA on the cultural resources surveys for the Project. WAPA is consulting with SHPO and interested tribes as part of the Section 106 compliance process.

The Applicant is in the process of completing cultural resources investigations for the Project, as described in the following sections, in accordance with Section 106 of the NHPA, SDCL 1-19A-11.1 and ARSD 20:10:22:23, to enable forecasting of potential impacts, respond with appropriate field studies, and develop impact avoidance or minimization measures.

20.5.1.2 Archaeological Resources

The following sections discuss existing archaeological resources in the Study Area.

20.5.1.2.1 Level I Records Search

The Applicant conducted a Level I records search of the Cultural Resources Study Area, defined as the direct APE plus a 1-mile buffer, to acquire data for previously recorded archaeological sites and cultural resource surveys, bridges, cemeteries, and structures. A review of the South Dakota SHPO records, maintained through the Archaeological Resource Management System (ARMS) and housed at the South Dakota Archaeological Research Center (SDARC), was conducted by Terri Bruce on February 7, 2018, with a follow-up records search on July 31, 2018. The records search identified 14 previously recorded archaeological sites within the Cultural Resources Study Area (Table 20-7).

Table 20-7: Previously Recorded Archaeological Sites Recorded Within the Cultural Resources Study Area

Site	Date Recorded	Site Type	Cultural Affiliation	NRHP Eligibility Status
39HD0024	9/9/1982	Stone/Tipi rings and cairns	Unknown aboriginal	Unevaluated
39HD0026	9/10/1982	Eagle catching pit	Unknown aboriginal	Not eligible
39HD0028	9/14/1982	Dug outs and depressions	Euro-American	Unevaluated
39HD0030	9/22/1982	Habitation	Unknown aboriginal	Eligible
39HD0031	9/23/1982	Surface scatter	Prehistoric	Unevaluated
39HD0035	9/15/1982	Homestead	Euro-American	Unevaluated
39HD0036	9/16/1982	Lithic scatter	Prehistoric	Unevaluated
39HD0037	9/17/1982	Isolated find – Projectile point	Prehistoric – Late Archaic/Early Woodland	Unevaluated
39HD0037 Update	04/26/1999	Non-farm ruins/Ree Heights Whistle Stop	Euro-American	Not eligible
39HD0064	11/09/1982	Stone/Tipi ring	Unknown aboriginal	Unevaluated
39HD0067	12/13/1982	Isolated find	Unknown aboriginal	Unevaluated
39HD0068	12/13/1982	Isolated find	Unknown aboriginal	Unevaluated

Site	Date Recorded	Site Type	Cultural Affiliation	NRHP Eligibility Status
39HD0084	10/1999	Farmstead	Euro-American	Not eligible
39HD0090	04/2001	Rombough – Schoolhouse	Euro-American	Not eligible
39HD0092	05/2001	Farmstead	Euro-American	Not eligible

Source: South Dakota ARMS, February and June 2018.

Seven previous cultural resource surveys have been conducted within the Cultural Resources Study Area (Table 20-8). Five of the previous surveys (archive numbers AHD-0055, ESD-0013, ESD-0228, ESD-0263 and ESD-0605) are crossed by the Project footprint, and these surveys include investigations for rural water system projects and a mortuary features study.

Table 20-8: Previous Cultural Resources Surveys Within the Cultural Resources Study Area

Project Title	Archive #	Author(s)	Report Date	Sites Recorded
A Level III Cultural Resources Inventory Report for NRCS Project #04HD80 Pipeline and Tank, T11N; R66W; Section 5 and 6, Hand County, South Dakota.	ADE-0034	Littlefield, Steven	2004	None
Letter Format Report of a Cultural Resources Inventory Survey of Mid-Dakota Rural Water System, Inc.'s Contract 4-2AP, Schedule 2 and 3 Pipeline Route Modification and Add-ons in Hand County, South Dakota (Change Order 20).	ADE-0055	Buechler, Jeff	2002	1
Report of the Class I and II Cultural Resources Investigations of a Portion of the Cendak Water Project Area, Eastern South Dakota.	ESD-0013	Haug, James A., Ronald J. Rood and Vicki Overholser Rood	1983	94
Results of a Stratified Disproportionate Sample Survey of Mid-Dakota Rural Water System's Contract 4-2 Project Area, North of the Crow Creek Reservation, in Faulk, Hand, Hughes, and Hyde Counties, South Dakota	ESD-0228	Buechler, Jeff	2000	13
Results of a Stratified Disproportionate Sample Survey of Mid-Dakota Rural Water System's Contract 4-2A Project Area (Excluding the Crow Creek Reservation) on Aurora, Beadle, Buffalo, Hand, Jerauld, Sanborn, and Spink Counites, South Dakota.	ESD-0263	Buechler, Jeff	2001	20

Project Title	Archive #	Author(s)	Report Date	Sites Recorded
Letter Format Report of a Cultural Resource Review and Survey of Mid-Dakota Rural Water System, Inc.'s Contract 4-2AP, Schedule 2 & 3 Re-routes and Add-ons in Beadle and Hand Counties, South Dakota (Change Orders 18-19).	ESD-0289	Buechler, Jeff	2002	None
An Archaeological Survey of Mortuary Features in Davison, Hand, Jerauld, Miner, and Sanborn Counties, South Dakota.	ESD-0605	Buhta, Austin A., Timothy V. Gillen, and Linda Palmer	2013	None

Source: South Dakota ARMS, February and June 2018.

20.5.1.2.2 Level III Intensive Survey

Level III intensive surveys require a visual inspection of the Cultural Resources Survey Area and may include subsurface testing. Intensive cultural resource surveys began in October 2018, and additional surveys will be conducted in 2019 to account for facility shifts once there is sufficient snow melt. The areas surveyed included the construction footprint and a buffer to allow for design modifications, together comprising a 2,371-acre Cultural Resources Survey Area. In addition to the Cultural Resources Survey Area, an additional 275-acres located outside of the Cultural Resources Survey Area were investigated for cultural resources; this area is hereafter referred to as the Cultural Resources Additional Survey Area. The Cultural Resources Additional Survey Area was surveyed at the request of the Applicant and consisted of portions of archaeological sites and TCPs that extended beyond the limits of the Cultural Resources Survey Area. Also included in the Cultural Resources Additional Survey Area were landforms adjacent to the Cultural Resources Survey Area that had a high potential for cultural resources.

The intensive survey was conducted by an archaeological survey team from Burns & McDonnell and a team of investigators from the Crow Creek Sioux and Yankton Sioux tribes.

A total of seven new archaeological sites, one previously recorded site (see Table 20-9), and three TCP sites were identified during the investigations. One of the newly identified archaeological sites, 39HD0120, is recommended as eligible for inclusion in the NRHP. The six remaining newly recorded archaeological sites (39HD0116, 39HD0117, 39HD0118, 39HD0119, 39HD0121, and 39HD0122) remain unevaluated against the NRHP criteria of significance. All seven newly recorded archaeological sites have been avoided by the Project. The NRHP status for previously recorded site 39HD0084 is recommended to remain not eligible for inclusion in the NRHP. Previously recorded site 39HD0084 would be avoided by the Project.

Table 20-9: Archaeological Site Recommendations within the Cultural Resources Study Area

Site No.	Site Type	Identified Component	Site Integrity	NRHP Recommendation	Recommendation
39HD0084 Update	Farmstead	Historic late 19th to early 20th century	Fair	Not eligible	Avoidance/No further investigation for this Project
39HD0116	Farmstead	Historic early to mid-20th century	Fair	Unevaluated	Avoidance/No further investigation for this Project
39HD0117	Schoolhouse – Kanaly	Historic mid-20th century	Poor	Unevaluated	Avoidance/No Further Investigation for this Project
39HD0118	Farmstead	Historic Early 20th century	Good	Unevaluated	Avoidance/No further investigations for this Project
39HD0119	Farmstead – Concrete foundation	Historic early to mid-20th century	Fair	Unevaluated	Avoidance/No further investigations for this Project
39HD0120	Three dugouts – multi-component	Prehistoric/Late 19th to early 20th century	Good	Eligible	Avoidance/No further investigations for this Project
39HD0121	Two dugouts and a single stone feature	Historic late 19th to early-20th century	Good	Unevaluated	Avoidance/No further investigation for this Project
39HD0122	Two Dugouts	Historic late 19th to early 20th century	Good	Unevaluated	Avoidance/No further investigation for this Project

During the joint tribal and intensive cultural resources surveys, three locations (see Table 20-10) were identified as containing prehistoric/unknown aboriginal cultural features. All three locations have been identified as TCPs. The NRHP eligibility status for the three TCP sites is yet to be determined. Individual features within the three TCP sites will be avoided by the Project.

Table 20-10: Traditional Cultural Properties Recorded within Cultural Resources Study Area

Site No.	Site Type	Identified Component	Site Integrity	NRHP Recommendation	Recommendation
TCP-HD-TEMP1	TCP	Prehistoric/ Unknown aboriginal	Good	Eligibility determination in Progress	Individual features avoided by the Project/No further investigations for this Project
TCP-HD-TEMP2	TCP	Prehistoric/ Unknown aboriginal	Good	Eligibility determination in Progress	Avoidance/No Further investigations for this Project
TCP-HD-TEMP3	TCP	Prehistoric/ Unknown aboriginal	Good	Eligibility determination in Progress	Individual features avoided by the Project/No further investigations for this Project

A detailed tribal survey report that contains an in-depth summary of the TCP sites, *Cultural Property Survey Report for the Sweetland Wind Farm, Hand County, South Dakota – Identification of TCP and Culturally Significant Properties during the 2018 Field Survey* (Blondo, 2019), will be submitted to as part of the NEPA process to WAPA by the Crow Creek Sioux Tribe and Blondo Consulting LLC.

20.5.2 Historic Architectural Resources Reconnaissance Survey

The following sections discuss existing historic architectural resources in the in the Study Area, including methods for documentation and assessment of previously unrecorded historic-age properties.

20.5.2.1 Historic Architectural Resources Background Review

The review of SHPO data identified 21 previously recorded historic-age non-archaeological resources comprising bridges and agricultural-related properties within the Project's visual or indirect APE, defined as 3 miles from the Project footprint, including turbines, access roads, and other facilities (Table 20-11). None of these are within the direct APE. One of the properties is listed on the NRHP, two are no longer extant, and the remaining eighteen have undetermined NRHP eligibility status.

Table 20-11: Previously Recorded Historic-Age Non-Archaeological Resources in the APE

Resource Name	SD SHPO Site ID[a]	Determination of Eligibility	Proximity	Notes
Marla Lichty Barn	26375	Not Evaluated	Indirect APE	
Luane Litchy Farmstead, Barn	26376	Not Evaluated	Indirect APE	Barn (Structure ID 31171) no longer extant
Steve Runge Barn	26377	Not Evaluated	Indirect APE	
Bridge 30-257-400	28290	Listed in 1993; NRHP 93001293	Indirect APE	Not accessible; not recorded

Resource Name	SD SHPO Site ID[a]	Determination of Eligibility	Proximity	Notes
Bridge 03-000-169	47643	Recommended Eligible	Indirect APE	
Bridge 03-000-178	47644	Recommended Not Eligible	Indirect APE	
Bridge 03-000-205	47645	Recommended Not Eligible	Indirect APE	
Bridge 03-009-190	47647	Recommended Not Eligible	Indirect APE	Not accessible; not recorded
Bridge 30-204-289	48473	Recommended Not Eligible	Indirect APE	Not accessible; not recorded
Bridge 30-224-330	48488	Recommended Not Eligible	Indirect APE	
Bridge 30-260-397	48503	Recommended Not Eligible	Indirect APE	No longer extant; replaced circa 2005
Bridge 30-290-385	48506	Recommended Not Eligible	Indirect APE	
Runge Farm	52462	Recommended Not Eligible	Indirect APE	

Source: South Dakota SHPO, accessed 2019
(a) SD SHPO Site ID is an identifier assigned by the South Dakota SHPO to a resource or collection of resources recorded in the state database application, the Cultural Resource Geographic Research Information Display (CRGRID).

20.5.2.2 Historic Architecture Reconnaissance Survey Results

A historic-age non-archaeological resource survey was completed for the Project in accordance with Section 106 of the NHPA and SDCL 1-19A-11(1) in January 2019. During the field survey effort, surveyors sought to document all buildings, structures, objects, districts, etc. constructed prior to 1973 (45 years of age or older) within the 3-mile indirect APE. The survey was conducted solely from publicly accessible roads and pursuant to winter weather conditions. All accessible resources within the APE were photo-documented, and their locations mapped for further assessment by the Project's U.S. Secretary of the Interior (SOI)-qualified Principal Investigator. Each resource was evaluated for both State and National designation.

Preliminary NRHP eligibility assessments were based on the U.S. SOI standards for identification and evaluation of historic resources, including the 50-year-age criterion and an assessment of resources' integrity and significance with regard to design or association with recognized historic contexts or significant individuals. This method of survey naturally favored resources that maintain significance for their architectural qualities; however, the historian also identified resources that may merit NRHP

consideration for their associations with historic development patterns in the Project vicinity. The historian also tried to determine if any historic agricultural, residential, or commercial districts extended into the Study Area. No such districts were identified during the survey effort.

The historians recorded 247 historic-age non-archaeological resources on 78 properties in the APE. Except for two properties in Beadle County and three bridges that cross the Beadle/Hand County line, all the resources are located in Hand County. Three previously recorded properties were not accessible at the time of survey due to road conditions and were not redocumented. One resource (Bridge 30-257-400) was listed on the NRHP in 1993, while the remaining two (Bridge 03-009-190 and Bridge 30-204-289) were recommended not eligible by previous surveyors. Regardless of eligibility, none of these resources would be subject to direct or otherwise adverse effects from the Project. Of the accessible resources, none are currently listed on the NRHP, but four appear to meet NRHP eligibility criteria. The latter include a previously recorded 1940 culvert constructed by the Work Projects Administration (Bridge 03-000-169); a circa 1900 abandoned schoolhouse (Rowen School); and two early twentieth-century general purpose barns. The remaining resources lack historical associations and architectural integrity and are not recommended for NRHP inclusion. None of the NRHP-listed or eligible resources would be adversely affected by the Project because their setting does not contribute to their significance and because the Project will not result in direct impacts. A report summarizing the results of the Historic Architecture Reconnaissance Survey is being prepared and will be submitted for SHPO review and in this docket when available.

20.5.3 Tribal Cultural Resources

As part of the NEPA process for approval of the WAPA interconnection, the Project requires compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. In carrying out the Section 106 review process, federal agencies must consult with any tribe that attaches religious or cultural significance to historic properties that may be affected by the agency's undertakings. As such, WAPA is conducting formal government-to government consultation with the tribes as part of the NEPA process for the Project. In addition, the Applicant has initiated informal tribal communication outside the formal Section 106 process.

WAPA sent letters on August 3, 2018, to the Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes, Cheyenne River Sioux Tribe, Crow Creek Sioux Tribe, Fort Belknap Indian Community, Lower Brule Sioux Tribe, Standing Rock Sioux Tribe, and Yankton Sioux Tribe. WAPA received several responses. The Crow Creek Sioux Tribe requested to participate in the cultural resource surveys during October 2018 and plans to continue to participate in additional surveys that would be conducted for the Project.

The Cheyenne and Arapaho Tribes responded that the Project was determined to be categorized as "no adverse effect," and requested that if Project changes alter the current APE, or if inadvertent discoveries are made that reflect additional evidence of TCP, the Applicant should promptly cease work and notify the Cheyenne and Arapaho Tribal Historic Preservation Office (THPO) office within 72 hours. The Yankton Sioux Tribe indicated sites of cultural significance or historic properties would potentially be affected by the Project and asked that the area be surveyed and monitored before and during construction of the Project.

Both the Crow Creek Sioux and Yankton Sioux tribes participated in the cultural resource surveys during October 2018. As discussed in Section 20.5.3, the Applicant has committed to having tribal monitors from the Crow Creek Sioux and Yankton Sioux tribes present during Project construction.

As discussed in Section 20.5.1.2, cultural and tribal resources were identified in the Cultural Resources Study Area during the October 2018 survey. Based on the results of the October 2018 surveys, the Applicant revised the location of wind turbines, access roads, underground collection lines, and the crane paths, to avoid cultural and tribal resources identified during the survey. Because the location of some of the wind facilities have changed, additional cultural and tribal surveys are required to survey the areas that were not evaluated in the October survey. As mentioned previously, these additional surveys will be conducted once sufficient snow melt allows for appropriate ground surface visibility, and the future surveys will be coordinated with the tribes who requested participation in the field surveys.

20.5.4 Cultural Resource Impacts/Avoidance & Mitigation Measures

The following sections describe the potential cultural and tribal resources impacts from development of the Wind Farm and Gen-Tie Line, and provide avoidance and mitigation measures, if applicable.

20.5.4.1 Wind Farm

The following subsections discuss potential effects to cultural and tribal resources from the Wind Farm facility.

20.5.4.1.1 Archaeological Resources

For archaeological sites identified during the intensive cultural resource surveys of the Wind Farm, a recommendation regarding their NRHP-eligibility and effect were made (Table 20-9). A 50-foot setback was established in consultation with WAPA for each archaeological site identified. The Project has been designed so that no wind turbines, access roads, laydown yard, Project substation, O&M building, switchyard, underground collection lines, Gen-Tie Line structure(s), or meteorological towers would directly impact identified archaeological sites. The Applicant will physically avoid NRHP-eligible and

unevaluated archaeological sites. No significant impacts to archaeological sites are anticipated for the Project.

The Applicant commits to the following standard BMPs for the Project:

- Unevaluated archaeological sites are being treated as eligible for the purpose of this Project, during Project construction and operation activities. An Unanticipated Discovery Plan has been prepared (included as part of the cultural resources report in Appendix O) outlining the procedures that should be followed if previously unknown archaeological sites or possible human remains are discovered during construction or operation activities. The Unanticipated Discovery Plan provides direction to onsite personal and contractors to follow if a discovery is made.
- If human remains are identified during Project construction, all work activity within the vicinity of the remains will cease upon discovery, and the County Sheriff will be contacted immediately. The remains will be carefully covered and secured for protection. If the remains are determined not to be part of an active crime scene or investigation, the South Dakota Chief State Archaeologist will be contacted, and the discovery will be protected until the South Dakota State Historic Society and the State Archaeological Research Center are consulted, in addition to any Native American tribes that have expressed an interest in the Project.

20.5.4.1.2 Architectural Resources

As the Project is subject to Section 106 of the NHPA, WAPA will determine if any architectural resources would be adversely affected by development of the Wind Farm. If a determination of "adverse effect" to a historic property is made, a formal Memorandum of Agreement (MOA) would be developed between WAPA, the SHPO, and other interested parties, including the Advisory Council on Historic Preservation if it chooses to participate. The MOA would include stipulations to mitigate adverse effects to the historic property and could outline tribal monitoring protocols. The document would be executed prior to initiation of Project construction. Currently, no adverse effects to historic properties are anticipated.

20.5.4.1.3 Tribal Cultural Resources

During the joint tribal and intensive cultural resource surveys of the Wind Farm, three traditional cultural resource properties, containing more than 500 individual features, were identified. The NRHP-eligibility status of the three TCP sites is in the process of being determined (Table 20-10). A 50-foot setback has been established for each prehistoric/unknown aboriginal feature. The Project has been designed so that no wind turbines, access roads, underground collection lines, Gen-Tie Line structure(s), laydown yard, Project substation, O&M building, switchyard, or meteorological towers would directly impact features

identified within TCP sites. The Applicant will physically avoid NRHP-eligible and unevaluated TCP sites. No significant impacts to TCP sites or prehistoric/unknown aboriginal feature are anticipated for the Project.

The Applicant commits to the following standard BMPs and avoidance and minimization measures for the Project:

- The Applicant agrees to the presence of tribal monitors during Project construction, and the Applicant will coordinate Project construction activities with participating THPOs.
- TCP sites that are in the process of having NRHP eligibility status determined (Unevaluated) will be treated as eligible for the purpose of this Project, during Project construction and operation activities. An Unanticipated Discovery Plan has been prepared, as described previously.
- If human remains are identified during Project construction, all work activity within the vicinity of the remains will cease upon discovery and the County Sheriff will be contacted immediately, as described previously.

20.5.4.2 Transmission Facility

The following subsections discuss potential effects to cultural and tribal resources from the Gen-Tie Line.

20.5.4.2.1 Archaeological Resources

No archaeological sites were identified within the Survey Area of the Transmission Facility during the intensive cultural resource surveys. No significant impacts to archaeological sites are anticipated for the Project. The Applicant commits to the same BMPs for the Gen-Tie Line as for the Wind Farm.

20.5.4.2.2 Architectural Resources

As the Project is subject to Section 106 of the NHPA, WAPA will determine if any architectural resources would be adversely affected by development of the Gen-Tie Line. If a determination of "adverse effect" to a historic property is made, a formal MOA will be developed, as previously described. The document would be executed prior to initiation of Project construction. Currently, no adverse effects to historic properties are anticipated.

20.5.4.2.3 Tribal Cultural Resources

Portions of the Survey Area for the Gen-Tie Line are encompassed by TCP-HD-TEMP1. The NRHP-eligibility status of TCP-HD-TEMP1 is in the process of being determined (Table 20-10). A 50-foot setback of Gen-Tie Line structure(s) has been established for each prehistoric/unknown aboriginal feature within the TCP site. The Project has been designed to avoid direct impacts to features identified within

TPC-HD-TEMP1. The Applicant will physically avoid NRHP-eligible and unevaluated TCP sites. No significant impacts to TCP-HD-TEMP1 or prehistoric/unknown aboriginal features within the site are anticipated for the Project. The Applicant commits to the same standard BMPs and avoidance and minimization measures for the Gen-Tie Line as for the Wind Farm.

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

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

The Project is expected to employ approximately 200 temporary workers over approximately 12 months for approximately 400,000 to 420,000 worker-hours to support Project construction. It is likely that general skilled labor is available in Hand County or the State to serve the basic infrastructure and site development needs of the Project. Specialized labor would 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 construction jobs by classification and annual employment expenditures during construction are included in Table 21-1; however, the number of jobs during the peak of construction may be higher.

Table 21-1: Anticipated Construction Jobs and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Crane operators	10	$90,000
Civil workers	30	$85,000
Construction managers	4	$110,000
Collection workers	25	$65,000
Tower erectors	35	$75,000
Transmission workers	30	$75,000
Substation workers	25	$80,000
Foundation workers	20	$70,000
Testing & inspections	13	$85,000
Design engineers	8	$140,000
Total:	**200**	**$17,500,000**

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

Table 21-2: Anticipated Operation Jobs and Employment Expenditures

Job Classification	Number[a]	Estimated Annual Salary[a]
Turbine supplier site manager	1	$100,000
Turbine technicians	6	$52,000
Owner site manager	1	$115,000
Assistant site manager	1	$85,000
Administrative assistant	1	$31,200
Total:	**10**	**$643,200**

(a) For the first 10 years of commercial operation, in 1-year intervals.

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

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

No future additions and modifications are anticipated. The Applicant does request turbine location flexibility, Gen-Tie Line structure type options, and other facility flexibility specified in Sections 8.2 and 8.3.

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

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

The Applicant has entered into long-term lease and easement agreements for placement of the wind turbines and associated Project infrastructure with private landowners within the Project Area. The Applicant anticipates that the life of the Project would be approximately 35 years (including a potential repower and/or retrofit of the turbines and power system with upgrades based on new technology).

The Project would be decommissioned in accordance with applicable State and County regulations and the Wind Leases. Wind turbines, underground collection lines, and the Gen-Tie Line would be removed in accordance with applicable State and County regulations, and turbine access roads would be removed unless otherwise agreed to by the landowner. Disturbed surfaces would be graded, reseeded, and restored as nearly as possible to their pre-construction conditions.

A decommissioning cost estimate for the Project is included in Appendix P, and the estimated net decommissioning costs for the Project are summarized in Tables 2-1 and 2-2 of that document. The decommissioning cost estimate assumed 71 GE 2.82/127 turbines and either 89-meter or 114-meter hub height. The net decommissioning cost (in 2019 U.S. dollars) is estimated to be $2.6 million assuming 89-meter hub height and $2.9 million assuming 114-meter hub height. The decommissioning cost per wind turbine is estimated to be $37,091 assuming 89-meter hub height and $40,956 assuming 114-meter hub height. These estimates are based on the decommissioning approach outlined in the decommissioning cost estimate in Appendix P and assume salvage of wind turbine and transmission facility components.

24.0 RELIABILITY AND SAFETY (ARSD 20:10:22:33.02, 20:10:22:35)

The following sections discuss the reliability and safety of the Project.

24.1 Wind Farm

The following sections discuss the reliability and safety of the proposed Wind Farm.

24.1.1 Reliability

Reliability (availability) is defined as the ability of the turbine to generate electricity when sufficient wind is available. GE has over 35,000 wind turbines currently installed globally (GE, 2019). GE's current turbine availability rate is 98 percent (GE, 2017). To further provide for reliability and to protect the Project financially, Sweetland requires availability guarantees from turbine manufacturers and O&M service providers to maintain the turbine at 98 percent availability or higher. If the turbine manufacturers and O&M service providers fail to maintain the required level of availability, then the turbine manufacturers and O&M service providers are required to pay liquidated damages for the lost revenue from lost energy production. Typically, the turbine manufacturer maintains the turbines for the first 5 or 10 years, then the turbines are maintained under O&M service contracts.

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

24.1.2 Safety

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

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

- Security measures would be implemented during the construction and operation of the Wind Farm, including temporary (safety) and permanent fencing, warning signs, and locks on equipment and wind power facilities;
- Access to each tower would be only through a solid steel door that would be locked and accessed only by authorized personnel;
- Tower exteriors would be designed to be unclimbable;
- Turbines would conform to applicable industry standards;
- A professional engineer would certify that the foundation and tower design of the turbines is within accepted professional standards, given local soil and climate conditions;
- Following construction, the Project will register Project underground facilities with the One-Call program.

24.1.3 Electromagnetic Fields

Natural and man-made sources of electromagnetic fields (EMFs) are commonplace in the United States. Man-made sources include wind farms, substations, and power lines, as well as ordinary household appliances, such as hairdryers, electric shavers, computers, wireless networks, cell phones, microwaves, and remote controls. Electric fields exist wherever an electric charge exists. A magnetic field exists when that charge is in motion (i.e., the flow of electrons to produce an electric current).

The frequency of transmission line EMFs in the U.S. is 60 Hertz (Hz) and falls in the extremely low frequency (ELF) range of the electromagnetic spectrum (any frequency below 300 Hz). For the lower frequencies associated with power lines, the 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.

Concerns about health effects of EMF were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields causes biological responses and health effects. Initial epidemiological studies completed in the late 1970s showed a weak correlation between surrogate indicators of magnetic field exposure (such as wiring codes or distance from roads) and increased rates of childhood leukemia (Wertheimer and Leeper, 1979). 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) concluded a review of health implications from magnetic fields and concluded, "…virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status" (WHO, 2007).

Natural and human-made EMFs are present everywhere in our environment. Natural electric fields in the atmosphere range from background static levels of 10 to 120 volts per meter (v/m) to well over several kilovolts per meter (kV/m) 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.

EMFs are vector quantities, which means they have a strength and a specific direction. The strength of an EMF decreases substantially with increasing distance from the source (NIEHS, 2018). EMFs may exist within the Project wind turbines, substation, and switchyard of the Wind Farm during Project operation. However, Sweetland has incorporated setback requirements and commitments into the design of the Project in compliance with State requirements, the Hand County Development Agreement, and the turbine manufacturer's (GE) recommendations (Table 9-1 and Appendix D). Furthermore, the Project substation and switchyard would be located on a fenced site on private property and would not be accessible to the public.

No impacts due to electromagnetic fields are anticipated.

24.2 Transmission Facility

The following sections discuss the reliability and safety of the proposed Gen-Tie Line.

24.2.1 Reliability

Transmission facilities are designed to operate for decades. Typically, they require only moderate maintenance, particularly in the first few years of operation. The estimated service life of the proposed transmission facility is approximately 40 years. Transmission infrastructure includes very few mechanical elements, which results in reliability. It is built to withstand weather extremes, with the exception of severe weather such as tornadoes and heavy ice storms. Transmission facilities are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions in the system are usually momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

24.2.2 Safety

The Gen-Tie Line will be designed in compliance with local, State, and good utility standards regarding clearance to ground, clearance to utilities, clearance to buildings, strength of materials, and right-of-way widths. The Applicant's contracted crews would comply with local, State, and utility standards regarding

installation of facilities and standard construction practices. Sweetland would use proper signage and guard structures when stringing wire across roads. Installation of the guard structures and signage would be coordinated with the owner of the transportation corridor being protected. Guard structures can be temporary wood poles with a cross arm or line trucks with their booms used to hold the wire and protect the lanes of traffic.

The proposed Gen-Tie Line would be equipped with protective devices, such as breakers and relays, to safeguard the public from the Gen-Tie Line if a transmission pole were to fall or other accident were to occur. Breakers and relays are located where the line connects to the Project substation and would de-energize the line in the event of an emergency. In addition to protective devices, proper signage would be posted warning the public of the safety risks associated with the energized equipment. Following construction, the Project will register Project underground facilities with the One-Call program.

24.2.3 Electromagnetic Fields and Stray Voltage

EMFs would exist along the transmission facility for the Project. Table 24-1 shows an example of how EMF levels decrease sharply with increasing distance for a 230-kV transmission line. As shown in the table, the magnetic field of a sample 230-kV transmission line decreases by 88 percent (from 57.5 to 7.1 mG) at 100 feet away from the transmission line and by 97 percent (from 57.5 to 1.8 mG) 200 feet away from the transmission line.

Table 24-1: Example EMF Levels with Increasing Distance from a Power Transmission Line

Transmission Line Voltage (kV)	Electric Field (kV)[a]				Average Magnetic Field (mG)[a]			
	At the Source	100 Feet Away	200 Feet Away	300 Feet Away	At the Source	100 Feet Away	200 Feet Away	300 Feet Away
230	2.0	0.3	0.05	0.01	57.5	7.1	1.8	0.8

Source: Bonneville Power Administration, 1994
(a) kV = kilovolt, mG = milligauss

For comparison, Table 24-2 provides EMF levels for common home appliances at distances up to 4 feet away.

Table 24-2: EMF Levels of Common Household Appliances

Appliance	Average Magnetic Field (mG)[a]	
	Within 6 inches	4 Feet Away
Blender	30-100	0
Dishwasher	10-100	0-1
Microwave oven	100-300	0-20

Appliance	Average Magnetic Field (mG)[a]	
	Within 6 inches	4 Feet Away
Electric range	20-200	0-6
Refrigerator	0-40	0-10
Vacuum cleaner	100-700	0-10

Source: Environmental Protection Agency, 1992
(a) mG = milligauss

The EPA recommends limiting EMF exposure to 0.5 to 2.5 mG (EPA, 1992). The nearest occupied residence/building to the centerline of the permanent easement of the 230-kV Gen-Tie Line (alternate route) would be 280 feet away; thus, the EMF exposure, based on the data extrapolated from Table 24-1, would be approximately 1 mG.

Stray voltage is a natural phenomenon that is the result of low levels of electrical current flowing between two points that are not directly connected. Impacts from stray voltage are typically related to improper grounding of electrical service to the farm (distribution lines) or on-farm electrical wiring. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences and they 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 taken to prevent stray voltage problems.

No impacts due to EMFs or stray voltage are anticipated.

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

ARSD 20:10:22:33.02. Information concerning wind energy facilities. *If a wind energy facility is proposed, the applicant shall provide the following information:*

(1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color;
(2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years;
(3) Any warning lighting requirements for the wind turbines;
(4) Setback distances from off-site buildings, right-of-ways of public roads, and property lines;
(5) Anticipated noise levels during construction and operation;
(6) Anticipated electromagnetic interference during operation of the facilities;
(7) The proposed wind energy site and major alternatives as depicted on overhead photographs and land use culture maps;
(8) Reliability and safety;
(9) Right-of-way or condemnation requirements;
(10) Necessary clearing activities;
(11) Configuration of towers and poles for any electric interconnection facilities, including material, overall height, and width;
(12) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower for any electric interconnection facilities; and
(13) If any electric interconnection facilities are placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.

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

- Configuration of wind turbines – Section 8.2 and Appendix A, Figure A-2 and Figure A-3
- Number of wind turbines – Section 8.2
- Warning lighting requirements for wind turbines – Section 8.2
- Setback distances – Section 9.2
- Sound levels during construction and operation – Section 15.3
- Electromagnetic interference – Section 15.6
- Site and major alternatives – Chapter 9.0 and Appendix A, Figure A-2
- Reliability and safety – Chapter 24.1
- Right-of-way or condemnation requirements – Chapter 8.0 and Section 9.3
- Clearing activities – Section 8.2.7
- Configuration of interconnection towers and poles – Section 8.3
- Conductor and structure configurations – Section 8.3
- Underground electric interconnection facilities – Section 8.2.5

Please refer to the Completeness Checklist (ARSD 20:10:22:33.02, Information Concerning Wind Energy Facilities) at the beginning of this application for additional requirement details.

26.0 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.

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

- Configuration of towers and poles – Section 8.3; Appendix A, Figure A-2 and Figure A-4
- Conductor configuration and size, length of span, and number of circuits – Section 8.3
- Proposed transmission site and major alternatives – Section 8.3 and Chapter 9.0; Appendix A, Figure A-2
- Reliability and safety – Section 24.2
- Right-of-way or condemnation requirements – Chapter 8.0 and Section 9.3
- Clearing activities – Section 8.3.3
- Underground dimensions – not applicable

Please refer to the Completeness Checklist (ARSD 20:10:22:35, Information Concerning Transmission Facilities) at the beginning of this application for additional requirement details.

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

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

27.1 Permits and Approvals

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

Table 27-1: List of Potential Permits or Approvals

Agency	Permit/Approval	Description	Status
Western Area Power Administration (WAPA)	National Environmental Policy Act (NEPA) compliance	Environmental Assessment (EA) required for interconnection to WAPA transmission line	To be completed prior to approval of interconnection agreement
U.S. Fish and Wildlife Service (USFWS)	Threatened and endangered species – Section 7 compliance	Determination of effect on federally listed species	To be completed in conjunction with WAPA EA
	Bald and Golden Eagle Protection Act (BGEPA) compliance	No take of bald or golden eagles, unless an eagle take permit is issued by the USFWS	No permit being pursued for the site due to low risk to eagles. Bird and Bat Conservation Strategy (BBCS) to be prepared for the Project.
	Gen-tie structure Installation/ Construction Authorization	Gen-tie line structures located within USFWS Grassland Easements will be covered within the NEPA review and EA	To be completed prior to installation of gen-tie structures located on USFWS Grassland Easements
	Special Use Permit	Temporary impact to USFWS Grassland Easements	To be completed prior to installation of underground collection lines on USFWS Grassland Easements
Federal Aviation Administration (FAA)	Form 7460-1, Notice of Proposed Construction or Alteration	Required if construction or alteration is within 6 miles of public aviation facility and for structures higher than 200 feet	Sweetland previously submitted Form 7460-1, Notice of Proposed Construction or Alteration with the FAA and received Determinations of No Hazard (DNHs). Current Forms 7460-1, were submitted February 14, 2019, for the new turbine array

Agency	Permit/Approval	Description	Status
U.S. Army Corp of Engineers (USACE)	Section 404 permit	Complete an application under the Clean Water Act for impacts to wetlands and waters of the U.S. Anticipate eligible for a non-reporting, nationwide permit (NWP)	Will be completed prior to construction
South Dakota State Historic Preservation Office (SHPO)	Section 106 consultation	Determination of effect on archaeological and historical resources	To be completed in conjunction with EA
Western Area Power Administration (WAPA)	Section 106 consultation with Native American tribes	Determination of effect on Native American cultural resources	To be completed in conjunction with EA
South Dakota Public Utilities Commission (SDPUC)	Energy Facility Permits	Application required for wind facilities with nameplate capacity greater than 100 megawatts	Submitted February 2019
South Dakota Game, Fish, and Parks (SDGFP)	Coordination	Voluntary coordination regarding effects on State-listed threatened or endangered species	Ongoing and will continue with post-construction monitoring
South Dakota Department of Environment and Natural Resources (SDDENR)	Section 401 Water Quality Certification	Complete an application under the Clean Water Act, only if Individual Permit is required for Section 404	Not anticipated
	General Permit for Storm Water Discharges Associated with Construction Activities	Storm water permit required for construction activities	Storm Water Pollution Prevention Plan (SWPPP) will be prepared and Notice of Intent will be submitted after final design is complete
	Temporary Water Use Permit	Temporary permits for the use of public water for construction, testing, or drilling purposes	If necessary, will be obtained prior to activity for which permit is required
	General Permit for Temporary Discharges	Temporary permit for the use of public water for construction dewatering	If necessary, will be obtained prior to activity for which permit is required
	Water Rights Permit for Non-irrigation Use	Needed if water will be appropriated for O&M facility	If necessary, will be obtained prior to activity for which permit is required

Agency	Permit/Approval	Description	Status
South Dakota Department of Transportation (SDDOT), Aeronautics Commission	Aeronautical Hazard Permit	Permit lighting plan determined with FAA coordination	Will be completed after final design is complete
South Dakota Codified Laws (SDCL) 49-32-3.1	Notice to telecommunications companies	Telecommunication companies review the preliminary electrical layout and may suggest revisions to reduce impact to their systems	Ongoing
SDDOT	Highway Access Permit	Permit required for any access roads abutting State roads	If necessary, will be obtained after final design is complete
	Utility Permit	Permit required for any utility crossing or use within State road right-of-way	If necessary, will be obtained after final design is complete
	Oversize & Overweight Permit	Permit required for heavy equipment transport over State roads during construction	Will be obtained prior to activity for which permit is required
Hand County and Townships	Development Agreement	Agreement regarding construction of the Project	Approved by the County Commission on November 8, 2018, and executed December 4, 2018
	Conditional Use Permit	Permits required for Project substation and switchyard	Will obtained prior to construction of substation and switchyard
	Individual Building Permits	Permit required for construction of each structure	Will be obtained prior to construction of structures
	County/Township Road Haul Agreement	Required for use of roads and for crossing roads with Project infrastructure	Will be obtained prior to utilizing haul roads and road rights-of-way
	Utility Crossing Permit	Required for crossing road rights-of-way	Will be obtained prior to crossing road rights-of-way

27.2 Agency Coordination

Throughout Project planning and development, Sweetland coordinated with various federal, State, and local agencies and governmental authorities to identify a preferred location for the Project and to address

potential concerns. Copies of agency correspondence and meeting summaries are included in Appendix B. A summary of agency comments and coordination efforts is provided below.

27.2.1 USFWS and SDGFP

Coordination with the USFWS and SDGFP is summarized in Table 27-2.

Table 27-2: Summary of USFWS and SDGFP Agency Coordination Activities

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
10/12/2016 and 10/14/2016	USFWS, Applicant	Project planning	In-person meeting at USFWS Huron Wetland Management District and subsequent email exchange regarding Project siting and avoidance of USFWS Easements
6/9/2017	USFWS, SDGFP, Applicant, WEST	Meeting	Email correspondence sent to USFWS and SDGFP to set up in-person meeting
8/14/2017	USFWS, SDGFP, Applicant, WEST	Grassland and Wetland Easements	USFWS Huron Wetland Management District provided known grassland and wetland easements within the proposed project boundary
8/15/2017	USFWS, SDGFP, Applicant, WEST	Meeting	Representatives from USFWS, SDGFP, Applicant, and WEST met in-person at the SDGFP Office in Pierre to discuss the Project and Tier 3 surveys planned for the Project
8/15/2017	USFWS, SDGFP, Applicant, WEST	Data received	SDGFP provided links to species monitored by the South Dakota Natural Heritage Program, South Dakota T&E Species, South Dakota Species of Greatest Conservation Need; quantifying undisturbed lands in eastern South Dakota (Bauman et al., 2013); and breeding bird atlas and species list from the two breeding bird blocks closest to the Project. SDGFP personnel also sent shapefiles of known prairie grouse locations within 2 miles of the Project.
9/11/2017	USFWS, SDGFP, Applicant, WEST	Study Plan, 2017 Raptor Nest Report and Meeting notes	At the request of Applicant, WEST submitted draft copies of the Sweetland Wind Farm Baseline Wildlife Study Plan, 2017 Raptor Nest Report, and meeting notes from the August 2017 in-person meeting
9/18/2017	USFWS, SDGFP, Applicant, WEST	Study Plan, 2017 Raptor Nest Report and Meeting notes	USFWS South Dakota Ecological Services Field Office provided comments on the Baseline Wildlife Study Plan, 2017 Raptor Nest Report, and meeting notes

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
3/7/2018	USFWS, SDGFP, Applicant, WEST	Study Plan, 2017 Raptor Nest Report and Meeting notes	At the request of Applicant, WEST submitted finalized versions of the Baseline Wildlife Study Plan, 2017 Raptor Nest Report, and meeting notes
5/22/2018	USFWS, SDGFP, Applicant, WEST, WAPA, Burns & McDonnell	Sweetland Environmental Assessment	Kick off call to discuss the Sweetland Environmental Assessment and WAPA interconnection
6/15/2018	USFWS, Applicant, WEST	NLEB surveys	At the request of Applicant, WEST contacted USFWS South Dakota Ecological Field Office personnel to discuss current plans for conducting NLEB bat surveys at the Project
6/29/2018	USFWS, Applicant, WEST	NLEB surveys	USFWS South Dakota Ecological Services Field Office indicated the current plans for NLEB surveys the Project were reasonable
7/31/2018	USFWS, Applicant, WEST	NLEB surveys	At the request of Applicant, WEST notified USFWS South Dakota Ecological Field Office personnel that no NELB calls were detected during the 2018 surveys
8/7/2018	USFWS, Applicant, WEST, WAPA, Burns & McDonnell, Hand County Board of Commissioners	Site visit	Representatives from USFWS, Applicant, WEST, WAPA, Burns & McDonnell and Hand County Board of Commissioners Office participated in a tour of the Project Area
8/7/2018	Applicant, WEST, WAPA, Burns & McDonnell	Public scoping meeting	Representatives from Applicant, WEST, WAPA, Hand County Board of Commissioners Office, and Burns & McDonnell participated in the public scoping meeting held in Miller, South Dakota.
12/14/2018	USFWS and Applicant	Grassland Easements	Applicant received digitized Grassland Easements from USFWS
1/11/2019	SDGFP, Applicant, WEST	Prairie Grouse Surveys	The intent of the meeting was to provide SDGFP with a project introduction/update, discuss methods and results from the first year of prairie grouse surveys conducted at the Project, discuss recommended setbacks and seasonal timing stipulations, and obtain SDGFP feedback
1/25/2019	USFWS, Applicant, WEST	Northern Long-Eared Bat Report	At the request of Applicant, WEST submitted the Northern Long-Eared Bat report along with the USFWS Northern Long-Eared Bat reporting spreadsheets

Date	Participants[a]	Event/Topic[b]	Discussion/Main Points
2/25/2019	SDGFP, Applicant, WEST	Prairie Grouse surveys	At the request of Applicant, WEST submitted draft meeting notes from the January 11, 2019 conference call
2/25/2019	USFWS, SDGFP, Applicant, WEST	First Year Baseline Avian Studies Report, Whooping Crane Stop-Over Habitat Assessment, 2018 Raptor Nest Report, Sweetland Grassland Assessment, 2017 Acoustic Bat Activity Report, 2018 Acoustic Bat Activity Report	At the request of Applicant, WEST submitted the First Year Baseline Avian Studies Report, Whooping Crane Stop-Over Habitat Assessment, 2018 Raptor Nest Report, Sweetland Grassland Assessment, 2017 Acoustic Bat Activity Report, 2018 Acoustic Bat Activity Report

(a) Applicant = Sweetland Wind Farm, LLC, WEST = WEST, Inc., USFWS = U.S. Fish and Wildlife Service, SDGFP = South Dakota Game, Fish and Parks, WAPA = Western Area Power Administration
(b) NLEB = northern long-eared bat

27.2.2 WAPA and SHPO/THPO

Because execution of an interconnection agreement with WAPA is a federal action, WAPA must consider the potential environmental impacts of the Project under NEPA. On May 22, 2018, WAPA participated in a kick-off call to discuss the Sweetland Wind Farm Environmental Assessment and WAPA interconnection. On August 7, 2018, representatives from WAPA and Hand County Commissioner J.D. Wangsness participated in a tour of the Project Area and in the public scoping meeting held in Miller, South Dakota. Starting on October 1, 2018, WAPA has led a monthly conference call with representatives from Sweetland and Burns & McDonnell to discuss the status of the NEPA document, ecological resources, cultural resources, and other Project considerations.

Also, because the Project has a federal nexus, it must comply with Section 106 of the NHPA to determine the potential effect on archaeological and historical resources. On November 1, 2018, WAPA submitted a letter, *Interconnection Request for the Sweetland Wind Farm, Hand County, South Dakota*, to Ms. Paige Olson, Review & Compliance Coordinator, for the South Dakota State Historical Society – South Dakota SHPO, describing the Project, defining the APE, and identifying WAPA as the lead federal agency for the Project. In a letter from the South Dakota State Historical Society addressed to Mr. David Kluth, Regional Preservation Officer with WAPA, Ms. Olson concurred with WAPA's recommendations for defining the APE for direct and indirect effects for the Project.

Also as a part of Section 106 compliance, WAPA must consult with any tribe that could have lands or cultural resources affected by the Project. A discussion of tribal coordination is provided in Section 20.5.2 of this application.

27.2.3 County

The Applicant met with Hand County starting in spring 2017 and continuing to the present. The Applicant was routinely on the Commission's agenda to provide Project updates and to address any concerns the Commissioners and the public might have regarding the Project. On August 7, 2018, J.D. Wangsness, as representative for the Hand County Commissioners, participated in a tour of the Project Area, and other commissioners participated in the WAPA public scoping meeting held in Miller, South Dakota, also on August 7, 2018. Sweetland submitted a Development Agreement to Hand County, which was approved by the County Commission on November 8, 2018, and executed December 4, 2018.

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

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

Table 28-1: List of Individuals Providing Testimony

Individual	Title and Organization	Subject Matter
Mark Wengierski	Project manager, Scout Clean Energy	Project overview
Douglas Shaver, M.S., R.P.A.	Cultural resources specialist, Burns & McDonnell Engineering Company, Inc.	Cultural
Todd Mabee	Senior ecologist, WEST, Inc.	Grasslands, bats, and avian
Carrie Barton	Senior environmental scientist, Burns & McDonnell Engineering Company, Inc.	Project generalist
Robert D. O'Neal, CCM, INCE Board Certified	Principal, Epsilon Associates, Inc.	Noise, shadow flicker

28.1 Applicant Verification

Michael Rucker, being duly sworn, deposes and states that he is the Authorized Representative of the Applicant and is authorized to sign this Application on behalf of the Project Owner/Applicant, Sweetland Wind Farm, LLC.

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

Dated this 6th day of March 2019.

Michael Rucker

29.0 REFERENCES

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