Triple H Wind Project
Hyde County, South Dakota

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

February 5, 2018

TRIPLE H WIND PROJECT, LLC

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
APLIC	Avian Power Line Interaction Committee
Applicant	Triple H Wind Project, LLC
Application	Facility Permit Application
ARSD	Administrative Rules of South Dakota
Basin	Basin Electric Power Cooperative
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BCC	Birds of Conservation Concern
BCI	Bat Conservation International
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
CFR	Code of Federal Regulations
Commission	South Dakota Public Utilities Commission
CRP	Conservation Reserve Program
CUP	Conditional Use Permit
CWA	Clean Water Act
CWCTP	Cooperative Whooping Crane Tracking Project
CWS	Canadian Wildlife Service
dB	decibel
dBA	A-weighted decibels
DONH	Determinations of No Hazard
ECPG	Eagle Conservation Plan Guidance, Module 1—Land-based Wind Energy Guidelines, Version 2
ELF	extremely low frequency
ENGIE	ENGIE North America, Inc.
EMF	electromagnetic field
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
GIS	Geographic Information System
GW	gigawatts
HF	high-frequency
HUC	Hydrologic Unit Code
Hz	Hertz

IPAC	Information, Planning and Consultation
ISO	International Organization for Standardization
km	kilometer
kV	kilovolt
LBNL	Lawrence Berkeley National Laboratory
LF	low frequency
LWES	Large Wind Energy System
m	meter
m/s	meters per second
MBTA	Migratory Bird Treaty Act
MET tower	meteorological tower
mG	milligauss
MW	megawatt
MWh	megawatt hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NLEB	northern long-eared bat
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NSR	noise-sensitive receptor
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
OE/AAA	Obstruction Evaluation/Airport Airspace Analysis
O&M	Operations and Maintenance
PGA	peak ground acceleration
PLSS	Public Land Survey System
PPA	power purchase agreement
Project	Triple H Wind Project
Project Area	27,247.5-acres
PTC	Production Tax Credit
Quivira	Quivira National Wildlife Refuge
SCADA	Supervisory Control and Data Acquisition

SDCL	South Dakota Codified Law
SDDENR	South Dakota Department of Environment and Natural Resources
SDDOA	South Dakota Department of Agriculture
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Department of Game, Fish and Parks
SDGS	South Dakota Geologic Survey
SDPUC	South Dakota Public Utilities Commission
SDSHS	South Dakota State Historical Society
SDSU	South Dakota State University
SGCN	Species of Greatest Conservation Need
SoDAR	Sonic Detection and Ranging
SPCC Plan	Spill Prevention, Control and Countermeasures Plan
SSURGO	Soil Survey Geographic Database
Study Area	Acoustic Assessment Study Area
SWPPP	Stormwater Pollution Prevention Plan
Triple H	Triple H Wind Project, LLC
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USEIA	U.S. Energy Information Administration
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WEG	Wind Energy Guidelines
WEST	Western Ecosystems Technology, Inc.
WIA	Walk-In Area
WMD	Wetland Management District
WNS	White Nose Syndrome
WoUS	Waters of the U.S.
WPA	Waterfowl Production Area
WRP	Wetland Reserve Program

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1.0 INTRODUCTION

1.1 Project Overview

Triple H Wind Project, LLC (Triple H or Applicant) respectfully submits this Facility Permit Application (Application) to the South Dakota Public Utilities Commission (Commission or SDPUC) for an Energy Facility Permit to construct and operate the Triple H Wind Project (Project), a wind energy facility as defined under South Dakota Codified Law (SDCL) 49-41B-2 (13). The total installed capacity of the Project will not exceed 250.24 megawatts (MW) and will include the construction of up to 92 turbines.

The Project is located entirely within Hyde County in the Public Land Survey System (PLSS) townships of Eagle, Chapelle, Highmore and Holabird, approximately 3.2 miles southwest of Highmore (Figure 1 in Appendix A). The Project will be located on privately held land within a Project Area that encompasses approximately 27,247.5 acres (Figure 1 in Appendix A).

Project components will include:

- Up to 92 wind turbine generators;
- Access roads to turbines and associated facilities;
- Underground 34.5 kilovolt (kV) electrical collector lines connecting the turbines to the collection substation;
- Underground fiber-optic cable for turbine communications collocated with the collector lines;
- A 34.5 to 345 kV collection substation;
- A 345 kV interconnection switching station;
- One permanent meteorological (MET) tower;
- A Sonic Detection and Ranging (SoDAR) Unit;
- An operations and maintenance (O&M) facility; and
- Additional temporary construction areas, including crane paths, public road improvements, laydown yard/staging area and concrete batch plant(s) (as needed)

The Project will interconnect to the high-voltage transmission grid via the Leland Olds to Fort Thompson 345 kV transmission line, which crosses the Project Area. A new 345 kV interconnection switching station connecting to the Leland Olds to Fort Thompson line will be constructed, owned and operated by Basin Electric Power Cooperative (Basin). Basin will construct and own a 345 kV interconnection facility connecting a new collection substation and the interconnection switching station. This approximate 500-foot-long transmission interconnection will be located wholly within the Project Area. As defined under SDCL Ch. 49-41B-2.1, an electric transmission line requiring a permit from the SDPUC is defined as a transmission line and associated facilities with a design of more than 115 kV. However, if such a transmission line is less than 2,640 feet in length, does not cross any public highway, and eminent domain is not used to obtain rights-of-way, the transmission line is not a transmission facility for purposes of the referenced chapter.

Because the interconnection facility is an approximately 500-foot long 345 kV transmission line, does not cross any public highways and does not require the use of eminent domain, it does not require a permit from SDPUC and will be permitted locally.

Triple H is a wholly owned subsidiary of ENGIE North America, Inc. (ENGIE). In North America, ENGIE manages a range of energy business in the United States and Canada, including retail energy sales and energy services to commercial, industrial, and residential customers; natural gas and liquefied natural gas distribution and sales; and electrical generation. ENGIE's North America renewable portfolio consists of wind, solar, and biomass/bio gas assets. In the United States and Canada, ENGIE's renewables portfolio has a capacity of close to 1,000 MW consisting of wind, solar, and biomass/biogas assets. In Canada, ENGIE is among the Top five wind developers with assets in Ontario, the Maritimes, and British Columbia. ENGIE operates over 700 MW of wind generation and has over 2,000 MW of wind projects in various stages of development.

The acquisition of Infinity has positioned ENGIE as a leading wind energy project developer with the ability to bring renewable energy projects to the United States market. The acquisition included over 8,000 MW of projects in various stages of development predominantly located in the central United States stretching from Texas to the Canadian border. The backing of ENGIE now provides the Infinity portfolio with the ability to take projects into construction and operation as a vertically integrated company. After 10 years of successful operation in United States, Infinity views this opportunity as the next step to increase the number of turbines it can install as well as significantly streamlining operations. ENGIE is developing projects throughout the Midwest and Great Plains, expanding its utility-scale renewable market through greenfield development and acquisitions. ENGIE recently acquired the Dakota Range Wind III project in Grant and Roberts counties in South Dakota.

1.2 Names of Participants (Administrative Rules of South Dakota [ARSD]20:10:22:06)

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

The Applicant is a South Dakota limited liability company. Individuals who are authorized to receive communications relating to the Application on behalf of the Applicant include:

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1.3 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.*

The Applicant will be the sole owner of the Project. Casey Willis, named above, is the Project Development Manager and primary contact.

1.4 Facility Permit Application Content and Organization

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

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

In this Application, Triple H has addressed each matter set forth in SDCL Ch. 49-41B and in ARSD Ch. 20:10:22 (Energy Facility Siting Rules) related to wind energy facilities. Included with this Application is a Completeness Checklist (Table 1-1) that identifies where each rule requirement is addressed in this Application.

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

- Complies with applicable laws and rules;
- Will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants in the Project Area;
- Will not substantially impair the health, safety or welfare of the inhabitants; and
- Will not unduly interfere with the orderly development of the region, having considered the views of the governing bodies of the local affected units of government.

1.4.1 Completeness Check

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

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11 (1) thru (12); 49-41B-35 (2)	20:10:22:05	**Application contents.** The application for a permit for a facility shall contain a list of each permit that is known to be required from any other governmental entity at the time of the filing. The list of permits shall be updated, if needed, to include any permit the applicant becomes aware of after filing the application. The list shall state when each permit application will be filed. The application shall also list each notification that is required to be made to any other governmental entity.	Section 22.1
49-41B-11(1)	20:10:22:06	**Names of participants required.** The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	Section 1.2
49-41B-11(7)	20:10:22:07	**Name of owner and manager.** The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	Section 1.3
49-41B-11(8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	Section 2.0
49-41B-11(12)	20:10:22:09	**Estimated cost of facility.** The applicant shall describe the estimated construction cost of the proposed facility	Section 3.0
49-41B-11(9)	20:10:22:10	**Demand for facility.** The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	Section 2.0
49-41B-11(2)	20:10:22:11	**General site description.** The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to State, county and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	Figures 1 and 2a-2b Section 4.0

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(6); 49-41B-21; 34A-9-7(4)	20:10:22:12	**Alternative sites.** The applicant shall present information related to its selection of the proposed site for the facility, including the following: (1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria; (2) An evaluation of alternative sites considered by the applicant for the facility; (3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	Figure 3a-3b Section 5.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:13	**Environmental information.** The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the facility. The environmental effects shall be calculated to reveal and assess demonstrated or suspected hazards to the health and welfare of human, plant and animal communities which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction. The applicant shall provide a list of other major industrial facilities under regulation which may have an adverse effect on the environment as a result of their construction or operation in the transmission site, wind energy site, or siting area.	Section 6.0

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
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.	Section 7.0 (1) Section 7.1 (2) Section 7.1, Figure 1 and Figures 4a-4c (3) Sections 7.1 and 7.2, Figures 4a-4c (4) Section 7.1.1.4 (5) Section 7.2, Figures 5a-5b (6) Sections 7.2.1 and 7.2.2 (7) Sections 7.1.1.4, 7.1.1.5, and 7.2.1.4 (8) Sections 7.1.1, 7.1.2, and 7.1.3

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:15	**Hydrology.** The applicant shall provide information concerning the hydrology in the area of the proposed plant, wind energy, or transmission site, and the effect of the proposed site on surface and groundwater. The information shall include: (1) A map drawn to scale of the plant, wind energy, or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility; (2) Using plans filed with any local, State, or Federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects; (3) A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission; (4) If aquifers are to be used as a source of potable water supply or process water, specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of ground water; (5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; and (6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.	Section 8.0 (1) Figures 6, 7 and 8; Sections 8.1 and 8.2 (2) Figures 6, 7 and 8; Sections 8.1, 8.2 and 8.3 (3) Figures 6, 7 and 8; Section 8.1 (4) Sections 8.1.1 and 8.3.2. (5) N/A (6) N/A
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 9.0 Figures 9, 10 and 11
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:17	**Effect on aquatic ecosystems.** The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, wind energy site, or siting area, an analysis of the impact of the construction and operation of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 10.0

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
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. Pasture lands 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.	Section 11.0 (1) Figures 9 and 12; Section 11.1 (2) Section 11.1.2 (3) Sections 11.1–11.7 (4) Sections 11.1–11.7
49-41B-11 (2,11); 49-41B-28	20:10:22:19	**Local land use controls.** The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should preempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	Section 12.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:20	**Water quality.** The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any Federal or State agency having jurisdiction and any variances permitted.	Section 13.0

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:21	**Air quality.** The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any Federal or State agency having jurisdiction and any variances permitted.	Section 14.0
49-41B-11(3)	20:10:22:22	**Time schedule.** The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.	Section 15.0
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.	Section 16.0 (1) Sections 16.1–16.4 (2) Section 16.1.2 (3) Section 16.2.2 (4) Section 16.1.2 (5) Section 16.4 (6) Section 16.4.4 (7) Sections 16.1–16.4
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.	Section 17.0

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(5)	20:10:22:25	**Future additions and modifications.** The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	Section 18.0
49-41B-35(3)	20:10:22:33.01	**Decommissioning of wind energy facilities.** Funding for removal of facilities. The applicant shall provide a plan regarding the action to be taken upon the decommissioning and removal of the wind energy facilities. Estimates of monetary costs and the site condition after decommissioning shall be included in the plan. The commission may require a bond, guarantee, insurance, or other requirement to provide funding for the decommissioning and removal of a wind energy facility. The commission shall consider the size of the facility, the location of the facility, and the financial condition of the applicant when determining whether to require some type of funding. The same criteria shall be used to determine the amount of any required funding.	Section 19.0 Section 4.12.11
49-41B 11(2,11)	20:10:22:33.02	**Information concerning wind energy facilities.** If a wind energy facility is proposed, the applicant shall provide the following information: (1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color; (2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years; (3) Any warning lighting requirements for the wind turbines; (4) Setback distances from off-site buildings, rights-of-way 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	Section 21.0 (1) Sections 4.1 and 4.2 (2) Section 4.2 (3) Section 9.2.3.1 and Section 12.0 (4) Section 5.2 and Section 12; Figures 3a and 3b (5) Section 4.12, Section 11.3 (6) Section 20.3 (7) Section 5; Figures 3a-3b and Figure 12; Appendix B (8) Section 20.1 (9) Section 4.11.1 (10) Sections 4.11, 6.0, 8.2.2.1 and 9.1.2.3. (11) Sections 4.2-4.10 (12) Section 4.10 (13) Section 4.12.4

Table 1-1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-7; 49-41B-22	20:10:22:36	**Additional information in application.** The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.	Section 22.0
49-41-B-35; 49-41B-11	20:10:22:39	**Testimony and exhibits.** Upon the filing of an application pursuant to SDCL 49-41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application.	Section 23.0
49-41B-22	N/A	**Applicant's burden of proof.** The applicant has the burden of proof to establish that: (1) The proposed facility will comply with all applicable laws and rules; (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area; (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government	Section 22.4

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2.0 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.*

The total installed capacity of the Project will not exceed 250.24 MW. The purpose of the Project is to generate electricity to supply the needs required for contracts with Triple H. Triple H has entered into two 30-year power purchase agreements (PPA), one with Walmart for 150 MW and one for 48 MW with a confidential institutional buyer. The remaining 52 MW will be sold on a merchant basis.

The Project will provide numerous local and regional economic benefits. The area where the Project is proposed is largely dependent on an agricultural economy. Local agricultural economies are sensitive to world commodity prices and weather. Wind energy adds significant revenue to existing farming operations and creates jobs in the local communities.

The Project will directly benefit local workers and local businesses. During construction, an approximately 250 MW wind project, such as Triple H, typically generates a need for up to 200 temporary construction jobs over a peak construction period of approximately 8 months. Construction and operation of a such a wind project results in millions of dollars being added into the local economy. These investments will benefit many local businesses in the community including hotels, restaurants, gas stations, auto repair companies, tire companies, grocery stores, and other local businesses. During operation, the Project will employ approximately 15 to 20 full-time personnel such as facility managers, site managers, and turbine technicians. Over the estimated 25-year life of the Project, the Project is expected to directly and indirectly generate millions of dollars in annual local revenue, including taxes, lease payments, and local staff salaries.

2.1 Renewable Power Demand

The 2018 Lazard Levelized Cost of Energy Analysis (version 12.0) provides an in-depth study of the levelized cost of all types of energy production, including renewable energy resources and more traditional technologies.

Based on this analysis, wind energy is the most cost-effective electricity source for customers, making it a desirable investment for utilities. New wind energy facilities are less expensive to construct than new conventional energy sources, even without the existing production tax credit program. Table 2-1 provides a comparison of the unsubsidized levelized cost of energy for both alternative and conventional energy sources. In general, alternative energy sources provide lower costs per megawatt hour (MWh) than conventional sources.

Table 2-1. Unsubsidized Levelized Cost of Energy

Energy Source	Energy Source	Levelized Cost ($/MW hour)
Alternative Energy	Solar Photovoltaic—Crystalline Utility Scale	$40-46
	Solar Photovoltaic—Thin Film Utility Scale	$36-44
	Solar Thermal Tower with Storage	$98-181
	Fuel Cell	$103-152
	Geothermal	$71-111
	Wind	$29-56
Conventional Energy	Gas Combined Cycle	$41-74
	Gas Peaking	$152-206
	Nuclear	$112-189
	Coal	$60-143

Source: Lazard 2018

2.1.1 National Energy Demand

In 2017, United States electricity customers consumed 3.7 billion MWh of energy (USEIA 2018a). In its Annual Energy Outlook 2017, the U.S. Energy Information Administration (USEIA) estimated that electricity demand in the United States will remain relatively flat and will rise 5 percent from 2016 to 2040 (USEIA 2017a). A U.S. Department of Energy-Office of Energy Efficiency & Renewable Energy (USDOE) report assessed the technical feasibility of using wind energy to generate 20 percent of the nation's electricity demand by 2030 (USDOE 2008). To meet this demand, United States wind power capacity will have to reach more than 300 gigawatts (GW). As of June 2018, the total amount of wind energy capacity in the United States had grown to approximately 90.1 GW (AWEA 2018a). Reaching a capacity of 300 GW will require an increase of more than 210 GW in 12 years or 17.6 GW per year.

In March 2015, the USDOE released its Wind Vision report, which builds on and updates the 2008 20 percent scenario based on wind power penetration of 10 percent by 2020, 20 percent by 2030, and 35 percent by 2050, utilizing plausible variations from central values of wind power and fossil fuel costs. The Wind Vision roadmap is not designed to achieve any specific clean energy or carbon reduction goals. Nevertheless, the contributions of wind power in the study scenario support clean energy and carbon reduction goals.

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

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

The demand for renewable energy from wind is extremely high as project costs decline and capacity increases (USDOE 2016). In many situations, wind energy and natural gas generation are being combined to produce the lowest cost baseload power, thereby driving need and demand. Wind energy is also being used as a long-term financial hedge against the price of electricity generated from natural gas. Most, if not all, of the region's power producers' resource plans call for increasing the use of fixed cost resources with zero fuel cost, zero pollution, and zero carbon emissions as a necessity to provide cost-effective electricity to their customers. Demand is coming from power producers signing long-term PPAs with wind energy projects or purchasing wind projects outright. Electric utilities signed approximately 31 percent (1,524 MW) of PPA capacity contracted for the year (3,317 MW) and announced plans to develop and own 1,491 MW of rate-based wind capacity (AWEA 2018a). New demand for wind energy is also coming from non-utility buyers. Corporate and other non-utility customers, such as Microsoft, Google, IKEA, Apple, eBay, Facebook, General Motors, and Walmart, all signed PPAs announced during the fourth quarter of 2017, comprising 40 percent of total capacity contracted for the year (2,178 MW), similar to the 39 percent share captured in 2016 (AWEA 2018a).

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

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

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

2.1.2 Regional and State Energy Demand

Over 25,000 MW of wind energy had been installed in the Midwest Wind Energy Center Region by the end of the fourth quarter of 2017, including 977 MW in South Dakota (NREL 2018a). In 2016, wind energy provided 30 percent of all South Dakota in-state electricity production, enough to power over 290,000 homes. The USDOE Wind Vision report projects that South Dakota could produce enough wind energy by 2030 to power the equivalent of 895,000 average American homes.

Load growth for South Dakota and North Dakota was last projected to be at least 2,100 MW over the next 10 years. South Dakota's current electric generation is primarily from hydroelectric (approximately 40 percent), coal (approximately 30 percent), and wind power plants (approximately 30 percent) (USEIA 2018c). South Dakota relies on shipments of coal from Wyoming to meet its coal demand and supplies of fossil fuels such as coal, oil, and natural gas are finite. Between 2011 and 2016, implementation of tighter

USEPA regulations on existing coal-fired plants accelerated retirements of outdated facilities. Since 2017, the decline in coal consumption has been attributed to availability of abundant, inexpensive natural gas (USEIA 2018b). Construction of new coal, nuclear or hydroelectric stations in the area is unlikely (USEIA 2018b).

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

State legislatures and governors in 29 states have adopted renewable portfolio standards. These standards require utilities to sell a specified percentage or amount of renewable electricity. The requirement can apply only to investor-owned utilities, but many states also include municipalities and electric cooperatives, although these latter have portfolio requirements that are equivalent or lower. Eight states, including South Dakota and one territory, have voluntary renewable energy standards or targets. In 2008, South Dakota established a voluntary Renewable, Recycled and Conserved Energy Objective that 10 percent of all electricity sold at retail within the state will be obtained from renewable energy and recycled energy sources by 2015 (SDCL 49-34A-101). According to the 2016 SDPUC Annual Report, only 7 out of 12 utilities in South Dakota have met the state's renewable energy goal (SDPUC 2017). The Triple H Project will provide a new source of low-cost energy in South Dakota and help the state and nation meet renewable energy goals and move towards the goal of energy independence, while reducing pollution and carbon emissions.

2.1.3 Local Benefits

The Project will add meaningful revenue to the local economy. Rural landowners and farmers on whose land the Project is listed will receive annual lease payments for each turbine sited or operational payments for land that does not receive a turbine on their properties. Because only a small portion of the land under lease will be used for the Project, farming operations can continue largely undisturbed.

The Project will be located within Highmore-Harrold School District Boundary and Triple H anticipates allocating approximately $2.16 million directly towards the school district during the first 9 years of operation. Over the estimated 25-year life of the Project, approximately $5.32 million in additional funds will be generated for school districts throughout the State as a whole.

Construction, operation, and maintenance of the facility are expected to create up to 200 temporary jobs during the peak construction phase and approximately 15 to 20 long-term facility managers, site managers, and turbine technicians, which will benefit local businesses. Statewide and nationally, the wind industry generates well-paying jobs in the entire supply chain, including engineering, manufacturing, and construction.

2.1.4 Consequences of Delay

If the Project is delayed, the Project's benefits to the local communities will not only be deferred but reduced. The Project must be constructed by the end of 2020 to receive 2.5 cents per kilowatt hour Production Tax Credit (PTC). If the Project does not reach operation until 2021 or later, it will not qualify for 100 percent of the PTC; the PTC per kilowatt hour will decrease by 20 percent each year until the Project is placed in service.

In addition, delay in the Project will result in several other consequences. First, the Project has existing PPAs that have been executed that have contractual COD requirements in them. If Triple H is not able to meet these deadlines, liquated damages will be incurred. Second, there is a substantial demand on turbines in 2020. A delay in the Project will result in the loss of the turbine delivery slot that has been locked in with GE resulting in significant uncertainty as to when additional turbine supply windows could be locked in. Third, similar to turbine availability, the availability of construction firms with significant wind turbine construction experience is limited in 2020. Triple H has selected to use Wanzek to construct the Project. A delay in the Project may result in the inability of Wanzek to support the construction of the Project due to other contractional obligations that Wanzek has with other projects throughout the country.

Delayed operation will also defer the local benefits of increased employment and spending in the community as well as tax revenue benefits to local school districts, the counties, and the state. Additionally, Project costs are subject to commodity flux and rise. If the Project were delayed, the construction costs might increase.

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

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

3.1 Capital and Operational Costs

The current estimated capital cost of the Project is approximately $290-300 million based on indicative construction and wind turbine pricing cost estimates for the proposed turbine layout. This estimate includes lease acquisition and permitting, engineering, procurement and construction of turbines, access roads, underground electrical collector system, Project collection substation, interconnection facilities, an O&M facility, a supervisory control and data acquisition (SCADA) system, one permanent MET tower, and Project financing.

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

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

4.1 Site Location and Overview

The Project is located entirely within Hyde County in the PLSS Townships of Eagle, Chapelle, Highmore, and Holabird, approximately 3.2 miles southwest of Highmore. The Project will be located on privately held land within a 27,247.5-acre Project Area. Table 4-1 lists the counties, townships, sections, and ranges within the Project Area. Figure 1 (Appendix A) shows the Project's location; Figure 2 (Appendix A) shows the preliminary Project layout.

Table 4-1. Project Location

County Name	Township Name	Township	Range	Sections
Hyde	Eagle	111N	72W	1-12, 18
Hyde	Chapelle	111N	73W	1, 2, 10-17, 20-23
Hyde	Highmore	112N	72W	19, 20, 28-35
Hyde	Holabird	112N	73W	24-29, 31-36

4.2 Wind Farm Facility

The Project will consist of up to 92 wind turbines with an aggregate nameplate capacity of up to 250.24 MW. The long-term operational facilities for the Project will also include underground electric collector lines, an interconnection switching station, a collection substation, an approximately 500-foot-long 345 kV interconnecting transmission facility, an O&M facility, access roads to each turbine, one permanent MET tower, and a SCADA system (installed with the collector lines). Figure 2a (Appendix A) shows the proposed layout of the Project facilities. Two potential locations are being considered for each of the following: the interconnection switching station, the collection substation, and the temporary laydown/staging area and are shown in Figure 2a (Appendix A). A preliminary location for the permanent MET is shown on Figure 2a (Appendix A),

The Project will generate utility scale electric power for residential, commercial, and industrial consumers. A detailed view of the Project configuration is shown in Figure 2b in Appendix A. As discussed further in Sections 11.3 and 12.0, proposed turbine locations meet all applicable state and county setback and noise requirements.

Figures 2a and 2b in Appendix A show 103 proposed wind turbine locations, of which up to 92 turbines will be built. The Project's layout is based on a detailed analysis of the Project Area and has been sited to avoid or minimize potential impacts. Further evaluation of the layout for constructability needs to be undertaken including, but not limited to, avoiding newly identified cultural resources or due to geotechnical investigations, title encumbrances, etc. that may require minor shifts in turbine locations or eliminate turbines from consideration. This will be completed by the summer of 2019 as final engineering for the Project will be based on the final 92 locations that are proposed to be used. Therefore, Triple H requests that the permit allow turbines to be shifted within 250 feet of their currently proposed location, as

long as specified noise and shadow flicker thresholds are not exceeded, cultural resource impacts are avoided, and conditions specified in the Energy Facility Permit can be complied with. If turbine shifts are greater than 250 feet, exceed the noted thresholds or do not meet the other limitations specified, Triple H will either use an alternate turbine location or obtain SDPUC approval of the proposed turbine location change.

As a result of final engineering, shifts in the access roads and collector system, as well as temporary facilities (e.g., concrete batch plant(s) and laydown yard/staging area), may also be necessary to accommodate turbine shifts, avoid identified resources, incorporate landowner input or to address other factors. Therefore, Triple H requests that the permit allow those facilities to be shifted, as needed, so long as they are located on leased land, cultural resources are avoided, and the conditions specified in the Energy Facility Permit can be complied with.

4.2.1 Wind Turbines

4.2.1.1 Wind Turbine Generators

The Project will consist of up to 92 three-bladed, horizontal-axis wind turbines (Figure 2a in Appendix A). The turbine proposed for the Project is the GE 2.72-116 turbine rated at 2.7 MW. Table 4-2 provides the wind turbine characteristics for this turbine model.

Table 4-2. Wind Turbine Characteristics

Characteristic	GE 2.72-116
Nameplate capacity (kW)	2,720
Hub height (m)[1]	90
Rotor Diameter (m)	116.5
Total height (m)[2]	148.3
Cut-in wind speed (m/s)[3]	3 m/s
Rated capacity wind speed (m/s)[4]	12 m/s
Cut-out wind speed (m/s)[5]	32 m/s average in a 600-second time interval. 37 m/s average in a 30-second time interval or 41 m/s average in a 3-second time interval
Wind Swept Area (m^2)	10,660
Rotor speed (rpm)	7.4-15.7

GE = General Electric kW = kilowatts
m = meters
m/s = meters per second rpm = rotations per minute
1 Hub height = the turbine height from the ground to the top of the nacelle.
2. Total height = the total turbine height from the ground to the tip of the blade in an upright position.
3 Cut-in wind speed = wind speed at which turbine begins operation
4 Rated capacity wind speed = wind speed at which turbine reaches its rated capacity
5 Cut-out wind speed = wind speed above which turbine shuts down operation
6 Maximum sustained wind speed = wind speed up to which turbine is designed to withstand

The GE 2.72-116 model contains emergency power supplies to allow operation of the control systems, braking systems, yaw systems and blade pitch systems, and to shut the turbine down safely if grid power is lost. Wind turbine blades convert linear energy from wind into rotational energy, which the hub transfers to the gear box or directly to the generator located within the nacelle. The transferred mechanical force is converted into electrical energy by the generator. Mechanical and/or ultrasonic anemometers and

weather vanes, located on the turbine nacelle, continuously collect real-time wind speed and direction data. Based on the data collected, the turbine yaw system constantly rotates the hub, blades, and nacelle into the wind, while the blade pitch system continuously adjusts the pitch of the blades to optimize the output of the generator. The pitch system also protects the turbine from over-speed events in high winds by pitching the blades perpendicular to the wind and aero-brakes the turbine to a stop in normal shutdown conditions. The mechanical braking system, located within the nacelle, is used to stop the turbine's rotation in the event of a storm or other turbine fault. The mechanical brake and lock-out system is used to lock the blade rotor to prevent the blades from spinning during maintenance periods or other times when the turbine is out of service. The gear box adjusts shaft speeds to maintain generator speed in low and high wind speeds. Electrical energy produced by the generator is transmitted through insulated cables in the power rail to a safety switch and then to a transformer located internally in the tower or externally on the base of the tower.

The Project's design includes safety and control mechanisms. These mechanisms are generally monitored using a 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 operation and maintenance staff. The SCADA system also allows the Project to be remotely monitored, thus increasing Project oversight, as well as the performance and reliability of the turbines. Not only will the local operation and maintenance office have full control of the wind turbines, but a 24/7 remote operations facility will also have control of the individual turbines. These two teams will coordinate to ensure that the wind turbines operate 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.

Operations, maintenance, and service arrangements between the turbine manufacturer and Triple H will be structured to provide timely and efficient operation and maintenance. The computerized data network will provide detailed operating and performance information for each wind turbine. Triple H will maintain a computer program and database for tracking each wind turbine's operational history.

4.2.1.2 Wind Turbine Towers

The towers will be conical tubular in shape and painted a non-glare white, off-white or gray, marked, and lit to comply with Federal Aviation Administration (FAA) requirements. The turbine tower, where the nacelle is mounted, will consist of three to four sections manufactured from certified steel plates. Welds will be made with automatically controlled power welding machines and are ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces will be sandblasted and multi-layer coated for protection against corrosion. Access to the turbine will be through a lockable steel door at the base of the tower. Within the tower, access to the nacelle will be provided by a ladder connecting four platforms and equipped with a fall arresting safety system.

4.2.1.3 Wind Turbine Foundations

Triple H plans to use a spread foundation design. Foundations for the towers will be approximately 2,700 square feet, with a depth of up to 10 feet. Except for approximately 12 inches that will remain

aboveground to allow the tower to be appropriately bolted to the foundation, the tower foundation will be underground. A specific foundation design will be chosen based on soil borings conducted at each turbine location.

The excavated area for the turbine foundations will typically be approximately 75 feet in diameter (37.5-foot radius, or approximately 9.3 acres for 92 turbines). During construction, a larger area up to 150-foot radius (up to 150 acres for 92 turbines) may be used to lay down the rotors and maneuver cranes during turbine assembly. For purposes of calculating temporary impacts in this Application, Triple H has assumed approximately 167 acres of total temporary disturbance from work/staging areas for 92 turbines. After construction, a 35-foot radius around each turbine will be maintained and graveled to prevent potential damage to the underground foundations and cabling that extends to each turbine. The resulting total long-term operational disturbance from the turbines will be reduced to approximately 8 acres, which will remain for the life of the Project.

4.2.1.4 Generator Step-up Transformers

At the base of each turbine, a step-up transformer will be installed to raise the voltage of the electricity generated by the turbine to the power collection line voltage of 34.5 kV. The external transformers will require small, concrete slab foundations within the gravel area at the turbine base for support. The exact dimensions of the transformers, concrete pad, and concrete slab will be dependent upon transformer manufacturer specifications and site-specific engineering requirements.

4.3 Meteorological Towers and SoDAR Unit

Four temporary MET towers were permitted and installed within the Project Area to study the wind resources at the site (one in 2017 and three in 2016). In addition, a SoDAR unit was installed in February 2018. Triple H proposes to construct one permanent MET tower within the Project Area. A preliminary location for the permanent MET tower is shown on Figure 2a (Appendix A). If deemed necessary, additional towers will be incorporated at later date. Final location of the proposed MET tower will be determined once the layout is final. The permanent MET tower is expected to be free-standing and will be equal to the turbine hub height.

4.4 Access Roads and Crane Paths

Where practicable, existing public roads, private roads, and field paths will be utilized to access Project components. The existing roads may require improvements before, during or following construction. Where necessary, new access roads will be constructed between existing roadways and Project components. The new and improved access roads will be all-weather, gravel surfaced and generally up to approximately 16 feet in width. During construction, some of the access roads will be widened to accommodate movement of the turbine erection crane, with temporary widths of up to 40 feet.

Separate access may be required for the cranes used to erect the wind turbines. In such cases, temporary crane paths will be constructed between turbine locations. Following completion of construction, the temporary crane paths will be removed and the area will be restored pursuant to the contractual easement obligations. The final access road design will be dependent on geotechnical information obtained during the engineering phase. It is anticipated that the access road network for the Project will include approximately 36.6 miles of new private access roads (Figure 2a in Appendix A). For purposes of calculating access road impacts in this Application, Triple H has assumed approximately 178 acres of

temporary disturbance and 71 acres of disturbance during the life of the Project for new private access roads.

Large construction cranes may spend as little as one day at each turbine site before moving on to the next. Cranes are sometimes moved cross-country rather than by using the developed access roads. There are a number of reasons for such cross-country movement. The first is time, taking a more direct route saves time. The second is cost. Breaking down the crane is time-consuming and can add costs to a project that can't be otherwise avoided if the crane needs to pass under an overhead utility line or due to other obstacles. This type of cross-country walking enables the crane to be moved without complete de-rigging and disassembly. Triple H also generally tries to avoid walking cranes on county roads or state highways as that could impede traffic and damage roads. Topography is another reason. Cranes cannot walk on inclines greater that 10 to 12 percent and many crane walk routes are designed around topography. Finally, cranes cannot cross a property that is not under easement. Where cranes are required to travel cross-country, workers will lay down some form of cribbing, bedding or mats to support the weight of the crane without impacting the underlying ground. The cribbing or mats will be removed immediately following passage of the crane, to be re-used elsewhere.

4.5 Temporary Laydown/Staging Area/Temporary Concrete Batch Plant

Triple H will grade a temporary laydown/staging area of up to approximately 10 acres within the Project Area on land under lease (Figure 2a in Appendix A). Two potential locations for the laydown/staging area have been identified. The laydown/staging area will provide parking for construction personnel, staging area for large equipment deliveries, and potentially maintain an on-site temporary concrete batch plant during construction. If a temporary batch plant is determined to be required for the Project, to prepare concrete for foundations onsite, it will be strategically placed to avoid cultural resources and temporarily impact up to 4 acres of the 10-acre laydown/staging area.

The laydown/staging area will also be used to conduct maintenance on construction equipment and vehicles and to store fuel. On-site fuel storage will have secondary containment and will be inspected regularly, with containment being remediated promptly in accordance with the Project's Spill Prevention, Control and Countermeasures (SPCC) Plan. Fuel handling activities and spill remediation will also adhere to the procedures outlined in the Project's SPCC Plan.

4.6 O&M Facility

The O&M facility will be located within the Project Area, in a location with proper transportation, communications facilities, and ease of access to Project facilities (Figure 2a in Appendix A). Construction of the up to 5-acre O&M facility will require a building permit from Hyde County. O&M buildings are typically approximately 5,000 square feet and house the equipment to operate and maintain the Project. Ambient conditions within the O&M facility will need to be maintained to meet equipment operating requirements and/or to support the presence of maintenance personnel. Heating of all occupied structures will be provided by propane stored on site. Although the electric power demands of the O&M building and the operating equipment will be supplied from the grid, emergency power generation will also be available on-site via a diesel engine/generator set.

4.7 Electrical Collector System

The proposed collector system layout based on the proposed turbine configuration is shown on Figure 2a (Appendix A).

From the step-up transformers at each turbine, which raise the voltage to 34.5 kV, power will run through an underground system of collection cables, collector buses, and feeder breakers, referred to as a collector system, that connects to the Project collection substation. The Project collection substation will raise the voltage to 345 kV to tie-in to the grid. Up to 55 miles of underground circuits will be installed by trenching, plowing or, where required, directionally boring the cables underground to avoid sensitive environmental conditions or meet other requirements. Generally, the electrical collector lines will be buried with marking tape and tracer wire to meet the appropriate national electrical code. Triple H will register the appropriate underground facilities with the South Dakota One-Call system.

4.8 Fiber Optic Communication System

When installing the collector system, Triple H will also install fiber optic communication systems connecting each of the Project's wind turbines to the Project collection substation and provide for communication among the wind turbines, collection substation, O&M facility and electrical grid as part of SCADA (see Section 4.2.1.1). If underground, the electrical and fiber optic cables will be placed in the same trench wherever possible and will include occasional aboveground junction boxes.

4.9 Project Collection Substation

The collection substation will be located generally in the center of the Project Area and would consist of two substation transformers, circuit breakers, switching devices, auxiliary equipment, a control enclosure containing equipment for proper control, protection, monitoring and communications and associated equipment and facilities. The principal function of the substation is to increase the voltage from the 34.5 kV at the collector system to the voltage of the 345 kV transmission line, which will transport the electricity of the entire Project to the grid via the interconnection switching station. The collection substation will be located within a fenced area. The fence will be designed in accordance with industry standards to provide safety and security.

Up to 5 acres of land will be purchased to facilitate construction and operation of the collection substation. Two potential locations under consideration for the Project collector substation are identified in Figure 2a (Appendix A). As discussed in Section 4.2, Triple H requests that the permit allow Project facilities, including the collection substation, to be modified as needed provided that the new locations are on land leased for the Project, cultural resource impacts are avoided and conditions specified in the Energy Facility Permit.

4.10 Interconnection Facilities and Switching Station

The interconnection switching station will be located within the Project Area adjacent to the Leland Olds to Fort Thompson 345 kV transmission line. The switching station will serve as the electrical interconnection between the Project and the MISO grid. The switching station will consist of 345 kV circuit breakers, disconnect switches, bus conductors, auxiliary equipment and a control enclosure containing equipment for proper control, protection, monitoring and communications. The switching station will be located within a fenced area. The fence will be designed in accordance with industry standards to provide safety and security.

Basin, the owner and operator of the Leland Olds to Fort Thompson 345 kV transmission line, will be responsible for the construction and operation of the switching station. Triple H and Basin worked together to determine the potential locations for the interconnection switching station as identified in Figure 2a (Appendix A). The interconnection switching station will utilize approximately 5 acres.

Basin will construct a 345 kV interconnection facility connecting the collection substation and the interconnection switching station. As discussed in Section 1.1 of this Application, because the interconnection facility is an approximately 500-foot long 345 kV transmission line, does not cross any public highways and does not require the use of eminent domain, it does not require a permit from SDPUC and will be permitted locally.

4.11 Land Requirements

Temporary construction and long-term operational land requirements are identified below. Table 6-1 presents impact calculations.

- Temporary construction land requirements:
    - 150-foot radius at each wind turbine location, which includes 60-foot-by-80-foot crane pad area at each turbine;
    - Access roads will initially be up to 40 feet wide to accommodate transportation of heavy construction equipment during construction;
    - 40-foot-wide crane paths (contingent upon turbine selection);
    - 40-foot-wide construction workspace to install collector and communication systems;
    - 10-acre temporary laydown/staging area;
    - 5-acre Project collection substation area;
    - 5-acre Project interconnect switching station area; and
    - 100-foot-by-100-foot MET tower workspace.
- Operational impacts during the life of the Project:
    - 35-foot-radius at each wind turbine location;
    - 16-foot-wide long-term operational access roads;
    - 5-acre O&M facility, which includes a building and adjacent parking lot;
    - 2.5-acre Project collection substation footprint;
    - 2.5-acre interconnect switching station footprint; and
    - 40-foot-by-40-foot MET tower.

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

Triple H did not use eminent domain powers to acquire easements for the Project. All land rights required for the wind energy facility were obtained through voluntary easements with property owners. Private land and public road rights-of-way will be used for all facilities. Further, Triple H will coordinate with federal, state, and local agencies to obtain appropriate permits for the Project (see Section 22.1).

4.12 Wind Farm Facility Construction, Restoration, Operation and Maintenance Procedures

Triple H plans to commence construction within 30 days of receiving all required federal, state, and local permits and approvals. Construction is expected to require a period of between 12 to 16 months to complete. Triple H anticipates that the majority of civil construction will begin in the fall of 2019 and be completed prior to winter. The construction crews will then demobilize for the winter period through the spring thaw (frost law period). Construction crews will then mobilize back to the Project in late spring 2020, with turbine deliveries occurring through the summer of 2020. Energization of the Project substation will occur by October 1, 2020 or earlier per contractual requirements with Basin. with a reduction in construction activities over the winter.

4.12.1 Mobilization and Site Preparation

The first step in construction will be to survey, stake and prepare the workspace for clearing. Triple H will then have the workspace cleared and graded, as necessary, to provide for construction access and the safe movement of equipment and personnel during construction. Silt fence and other erosion control measures will be installed in accordance with the Project's Stormwater Pollution Prevention Plan (SWPPP) and applicable permit conditions. Environmentally sensitive areas will be marked for avoidance. Triple H will implement appropriate safety measures before excavation begins, including notification through the South Dakota One-Call system to ensure third-party utilities and adjacent pipelines are properly marked. Equipment and vehicles will be transported to the Project Area and staged at the temporary laydown/staging area. During construction activities, dust control measures will be applied to manage dust along access roads, the laydown/staging area and other construction workspaces.

Potable water and sanitary facilities will be established to support the construction crews at the Project site. Potable water will be provided from off-site facilities and sanitary facilities will be provided in the form of portable latrines by an outside vendor. Some construction areas and the laydown/staging area will be fenced to prevent access by wildlife or unauthorized personnel as needed.

4.12.2 Roadwork

Triple H will construct one gravel access road to each turbine location. Access roads will initially be up to 40 feet wide to accommodate transportation of heavy construction equipment during construction. Before gravel is placed on the access roads, topsoil will be removed and stockpiled in the temporary construction workspace, subsoil will be compacted, and a geotextile matting will be installed. Triple H will install temporary culverts and field approaches where needed to maintain adequate access and drainage throughout construction.

After construction has been completed, temporary access roads will be converted to narrower, long-term operational access roads up to 16 feet wide. These long-term operational access roads will be maintained to facilitate access to the turbine for ongoing operation and maintenance. The temporary portion of the access roads will be restored after use by removing the gravel and geotextile fabric, decompacting the subsoil and replacing the stored topsoil.

A similar process will be used to develop crane paths. Triple H will clear, grade, and segregate the topsoil along the crane paths and compact the subsoil. Once construction is complete, crane paths will be restored by decompacting the subsoil, replacing the topsoil, and seeding in accordance with landowner or local agency requests.

Public roads may also need improvements to allow for the safe and efficient access of flatbed trailers carrying the turbine tower components to the Project Area. Triple H is in the process of identifying the best haul route to the Project Area and where existing road improvements may be required. Final haul routes will be selected in consultation with the Hyde County Road Department. Triple H will work with the appropriate federal, state and/or local agencies to obtain the permits required for these improvements. See Section 16.4 for more information.

4.12.3 Installation of Turbine Foundations

Triple H will next initiate the construction of the wind turbine foundations by clearing, removing, and stockpiling the topsoil and subsoil from each turbine site. Topsoil and subsoil will be stored separately in a semicircle around the foundation. Foundations will be constructed by excavating an approximately 75-foot diameter hole, placing reinforcing steel and pouring concrete into the excavation. Next, the subsoil and topsoil will be replaced over most of the concrete foundation, leaving only the center of the foundation above the surface grade.

Triple H will clear, grade, and develop a 150-foot radius around each turbine location, including a 60 by 80-foot crane pad area extending from the access road to the turbine foundation, that will be used to erect the turbine tower. After construction, a 35-foot radius around each turbine will be maintained and graveled to prevent potential damage to the underground foundation and cabling that extends to each turbine. The remaining temporary construction area around each wind turbine will be restored and returned to its pre-construction use pursuant to the contractual easement obligations.

4.12.4 Installation of Electrical Collector and Communication Systems

To install the underground collection lines and fiber optic cables, Triple H will trench, plow or, where needed, directionally bore the cables underground to avoid sensitive environmental areas or to address other needs. Trenching and plowing are anticipated to be the primary methods of installation. Typical collector lines will be installed at least 42 inches below grade. Generally, the electrical collection lines will be buried with marking tape and tracer wire per appropriate national electrical code and the Project will register the appropriate underground facilities with the South Dakota One-Call system. Lines are typically plowed in using bull dozers and associated plowing equipment. Where trenching is appropriate, topsoil will be segregated according to applicable permit conditions. The cables will be placed into the trench and backfilled. During backfilling, subsoil will be replaced first and then the topsoil will be replaced.

4.12.5 Tower Deliveries and Erection

The first sections of the turbine to be delivered and erected are the base and mid-sections of the tower. These will be transported to the Project Area by semi-truck and then assembled by crane in the crane pad area. The typical process includes the following steps.

- First, the two tower sections are assembled, and the base is bolted to the foundation.
- Next, the top tower section is erected and then the nacelle is raised and bolted to the top.
- Finally, the blades are connected to the hub, collectively called the rotor assembly, which is then connected to a shaft that passes into the nacelle.

Each turbine takes approximately 4 to 5 days to erect from offload to pre-assembly and effecting staging of components. Once installed, Triple H will mark and light the turbines to comply with (FAA requirements and the requirements of other permits.

4.12.6 Construction of O&M Facility

The O&M facility will require initial civil and grading work to establish the building pad and create positive drainage for the parking and yard area. Underground foundations will be installed along with below grade mechanicals. The building will be erected, internal finishes will be installed, and gravel will be placed in the parking and yard area. Water supply facilities and septic are discussed in Section 8.3.2.

4.12.7 Construction of Project Collection Substation

The Project collection substation area will require initial civil and grading work to prepare for construction and to create positive drainage for the facilities. The collection substation will be constructed and all associated safety, electrical and controls equipment will be installed using applicable utility standards. Power and control cables will be routed, and additional pre-operational testing could begin once the system(s) are energized. Once the Project is fully operational, all systems will then be re-checked. Final site civil work will be completed. Once all final checks have been completed, the facility will be turned over to operations for in-service operation.

4.12.8 Installation of Permanent Meteorological Towers

Similar to turbines, one MET permanent tower will be erected using a crane. The base will be erected and bolted to the foundation. A 100-by 100-foot square of temporary workspace will be required for foundation installation and stacking the MET tower. The foundation will be a 10-by 10-foot square and long-term operational access roads will be required. Triple H will paint the MET tower to meet applicable regulations and best practices to improve visibility. Triple H will also notify local airports about the Project and new towers in the area to reduce the risk to crop dusters. The permanent MET tower will be free-standing with no guy wires and equipped with FAA approved lighting and markings.

4.12.9 Restoration Procedures

Once construction is complete, the construction workspace will be cleaned up and restored. All temporary construction workspaces, such as the crane paths, temporary access roads, the temporary laydown/staging area and extra workspace areas (e.g., crane pad) will be restored by removing gravel (where applicable), decompacting the subsoil and replacing stored topsoil to pre-construction conditions pursuant to the contractual easement obligations. Temporary and long-term operational stabilization measures, such as

slope breakers, mulching and seeding with the appropriate seed mix will then be implemented. Triple H will compensate landowners for damages from Project construction to crops, tile, fences, or other property.

Triple H will develop and implement a Noxious and Invasive Weed Management Plan that will identify and establish the procedures to prevent the introduction and spread of noxious and invasive weeds during construction and ongoing operations. Additional information regarding noxious weeds is available in Section 9.1.

4.12.10 Operation and Maintenance

The expected life span of the Project is approximately 25 years. As described in Section 4.2.1, all proposed turbine models have SCADA communication technology to control and monitor the Project. The SCADA communications system permits automatic, independent operation and remote supervision, allowing the simultaneous control of the wind turbines at all times. An O&M crew will be on-site during normal working hours to monitor turbine operation from the O&M facility and to conduct maintenance activities.

All major components of wind turbines will undergo routine maintenance according to the schedules established by the component manufacturer. Examples of such activities include lubrication filter replacements, gear oil changeouts, adding coolant, greasing, and applying paints or coatings for corrosion control. Over the life of the turbine, some mechanical components may also need repair or replacement.

Other activities include the regrading and gravel replacement on access roads, routine electrical inspections, and the application of herbicides to control noxious and invasive weeds. Triple H will also conduct routine preventative maintenance testing of on-site emergency power generators and maintain fuel levels of on-site propane and fuel tanks.

Access doors to individual turbine towers will be secured against unauthorized entry at all times. Doors to the O&M facility and equipment enclosures will also be locked and physical barriers, such as fences, will be maintained around the Project collection substation, interconnection switching station and individual tower transformers to prevent unauthorized entry.

4.12.11 Decommissioning

The anticipated Project life is approximately 25 years beyond the date of initiating commercial operation. At the end of commercial operation, Triple H will be responsible for removing wind facilities and the turbine foundations to a depth of four feet below grade. In this case, a decision may be made on whether to continue operation with existing equipment or to retrofit the turbines and power system with upgrades based on newer technologies.

Triple H will be responsible for all costs to decommission the Project and associated facilities. The cost to decommission will depend upon the prevailing rates for salvage value of the equipment and labor costs. Because of the uncertainties surrounding future decommissioning costs and salvage values, Triple H will review and update the cost estimate of decommissioning and restoration for the Project every five years after Project commissioning. See Section 19.0 of this Application for more detail on decommissioning.

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5.0 ALTERNATIVE SITES AND SITING CRITERIA (ARSD 20:10:22:12)

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

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

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

The following sections describe the criteria that were considered in determining the development potential of the site, identifying the appropriate Project Area to develop, and designing the Project's proposed configuration within the Project Area. Included is a summary of how Triple H has voluntarily followed the U.S. Fish and Wildlife (USFWS) Land-Based Wind Energy Guidelines (WEG; USFWS 2012) to minimize risks to species of concerns.

5.1 Site Evaluation Process and Project Area Refinement

Development of a wind energy project is an iterative process that involves: (1) site identification; (2) project area refinement; and (3) micrositing of project infrastructure. The identification of the Project Area was primarily driven by:

- Available wind energy resource;
- Ready access to transmission interconnection;
- Land use and environmental compatibility with wind development; and
- Landowner support for wind energy development.

Each of these factors is discussed further below.

5.1.1 Wind Resource

Strong wind speeds—key for development of a competitive, economically viable wind project—occur in the region and in the immediate area of the Project. Wind resources in the Project Area are significantly better than an average site in the upper Great Plains, making the Project very competitive on a regional basis. Areas with an annual average wind speed around 6.5 meters per second (m/s) and over 80 meters (m) in height are generally considered to have a wind resource suitable for development. According to the USDOE (2017b), wind resources within the Project's region range from 8.0 to 9.0 m/s at Triple H's

proposed turbine hub height of (90 m), resulting in a highly suitable wind resource for economical, sustainable, and reliable production of power is available at Triple H's proposed turbine hub height of 90 m.

5.1.2 Ready Access to Transmission Interconnection

The Leland Olds to Fort Thompson 345 kV transmission is located within the Project Area. This transmission line provides direct access to available transmission minimizes the interconnection infrastructure needed and helps reduce overall Project costs. No state-permitted transmission line is required to implement this Project.

5.1.3 Land Use and Environmental Compatibility

The Project Area was selected following a review of the surrounding land use and regional constraints. The Project is compatible with the existing primarily agricultural land uses, consisting of crop production, pasture land and 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.

Once the initial site location had been selected, the Project Area was modified over time based on landowner interest and to avoid environmental concerns based on consultations with federal, state, and local agencies.

Triple H conducted an evaluation of a 52,812-acre easement area available to propose wind turbines for the Project after applicable setbacks and constraints were applied (Appendix B). After all setbacks were applied, 12,408 acres of the original easement area was available to place wind turbines, representing over a 76% decrease in area. This area was further evaluated for Project layout configuration.

5.2 Site Configuration Alternatives

Figure 2a (Appendix A) shows 103 proposed wind turbine locations, of which only up to 92 turbines will be built. The proposed layout of 92 turbines reflects an optimal configuration to best capture wind energy within the Project Area, while avoiding negative impacts to residences, known cultural resources, wetlands, grasslands and sensitive species and their habitats.

As discussed in Section 4.2, final engineering could result in minor turbine location adjustments. However, the final Project layout will comply with all applicable federal, state, and local requirements, including the state and local requirements and/or commitments listed in Table 5-1 below. The buildable area for turbines, after considering the setbacks in Table 5-1 as well as additional environmental setbacks, is visually depicted on the siting constraints maps provided as Figures 3a and 3b (Appendix A) and discussed further in Appendix B.

Table 5-1. Triple H Turbine Siting Requirements/Commitments

Category	Requirement/Commitment
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. However, if the owner of the wind turbine tower has a written agreement with an adjacent land owner allowing the placement of the tower closer to the property line, the tower may be placed closer to the property line shared with that adjacent land owner (SDCL 43-13-24).
Hyde County	
Setbacks	1. The setback from any established dwelling shall be 2,640 feet or 4.9 times tower height, whichever is greater; an exception may be granted in the event that all adjoining property owners sign an opt out from the setback requirement. The opt out may result in a setback of no less than 1,400 feet minimum from an established dwelling or one point one (1.1) the system height; whichever is greater. 2. The setback from any county gravel roads, section line roads, highways and minimum maintenance roads shall be not less than 750 feet or 1.4 times the tower height, whichever is greater. 3. Distance from the exterior boundary of the proposed wind project shall be not less than 500 feet or 1.1 times the system height, whichever is greater, unless appropriate opt out has been obtained from all adjoining property owners.
Noise	Noise level produced by the LWES shall not exceed 45 decibels of sound at the perimeter of occupied residences existing at the time the permit application is filed, unless a signed waiver or easement is obtained from the owner of the residence. The level, however may be exceeded during short-term events such as utility outages or wind storms.
Turbine Spacing	The turbines shall be spaced no closer than is allowed by the turbine manufacturer in its approval of the turbine array for warranty purposes. Minimum spacing is actually rotor diameter, which is greater than manufacturer requirements.
Flicker	Flicker at any receptor shall not exceed 30 hours per year within an established dwelling and 40 hours per year from any occupied structure.
Height from Ground Surface	The minimum height of blade tips at their lowest possible point shall be 25 feet above grade.
Voluntary Setbacks	
Transmission (Distribution)	Triple H will voluntarily apply a setback of 534 feet from distribution lines found within the Project Area.
Transmission (Existing)	Triple H will voluntarily apply a setback of 634 feet from existing transmission lines found within the Project Area.
Substations	Triple H will voluntarily apply a setback of 566 feet from substations found within the Project Area.
Microwave Beam Paths	Triple H will voluntarily apply a setback of 223 feet from microwave beam paths found within the Project Area.
Northern Long-eared Bat Habitat	Triple H will voluntarily apply a setback of 1,000 feet from identified suitable Northern Long-eared bat habitat found within the Project Area.
Streams	Triple H will voluntarily apply a setback of 100 feet from streams found within the Project Area.
Waterbodies	Triple H will voluntarily apply a setback of 100 feet from waterbodies found within the Project Area.
Wetlands	Triple H will voluntarily apply a setback of 250 feet from wetlands found within the Project Area.

5.3 Lack of Reliance on Eminent Domain Powers

Triple H does not have eminent domain powers to acquire easements for the Project. As a result, selection of an alternative site will not reduce reliance on eminent domain powers. Private land rights and public road rights-of-way will be used for all facilities. All private land rights required for the wind energy facility were obtained through voluntary leases with property owners. Triple H will obtain necessary road permits from road authorities prior to construction. Further, Triple H will coordinate with federal, state, and local agencies to obtain appropriate permits for the Project.

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

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

Sections 7.0 through 11.0 and Sections 13.0, 14.0 and 16.0 provide descriptions of the existing environment at the time of Application submittal, the potential changes to the existing environment that are anticipated as a result of Project construction and operation and the irreversible changes that are anticipated to remain beyond the operational lifetime of the facility. These sections also identify the avoidance, minimization and mitigation measures that will be implemented for the Project.

Impacts are quantified where possible based on either publicly available information or field survey data. For purposes of analyzing environmental resource impacts both temporary construction and long-term operational impacts were evaluated, including both potential collection substation, interconnection switching station, and laydown area locations. For this reason, impacts to environmental resources are based on a worst-case scenario.

No other operating energy conversion facilities, existing or under construction, or other major industrial facilities under regulation occur within or adjacent to the Project Area. Two operating energy conversion facilities are located in proximity to the Project Area (Figure 1 in Appendix A):

- The South Dakota Wind Energy Center is a 40.5 MW facility located approximately 3 miles southeast of the Project Area. This NextEra Energy Resources wind farm consists of 27 turbines and has been in operation since 2003.
- The Titan Wind Project, consisting of 10 turbines generating 25 MW, is located approximately 13.8 miles east of the Project Area. This project has been in operation since December 2009.

Although the SDPUC has siting authority for wind farms with a capacity of 100 MW or more and both of these facilities fall below that threshold, Triple H has reviewed the cumulative effects associated with the operation of both wind projects listed above and the currently proposed Project.

Because of the distance of the Titan Wind Project from the Project Area, construction and operation of the Project will not result in cumulative effects on resources in the area from siting the Project.

Triple H, in combination with the 40.5-MW South Dakota Wind Energy Center, will result in the construction and operation of up to 119 wind turbines and associated access roads, collector lines and other facilities in Hyde County. The South Dakota Wind Energy Center turbines are in short east-west oriented strings, with the strings approximately 2 to 4 miles long (Figure 1 in Appendix A).

Table 6-1 presents both the temporary construction impacts and long-term operational impacts by Project component and is limited to the final Project layout not including alternative collection substation, interconnection switching station, and laydown area locations. See section 4.0 for additional information on Project components.

Table 6-1. Summary of Triple H Ground Disturbance Impacts

Project Component	Construction Impacts (Temporary)		Operational Impacts (Long-Term)	
	Dimensions	***Total Acreage***	***Dimensions***	***Total Acreage***
Turbine Foundations (includes crane pad area adjacent to turbine foundation)	150-foot radius x 92 turbines	149	35-foot radius x 92 turbines	8.1
Access Roads[1,2]	40-foot wide x 36.6 miles	178	16-foot wide x 36.6 miles	71
Electrical Collector and Communication Systems	40-foot wide x 57.7 miles	268	N/A	0
Temporary Laydown/Staging Area and Batch Plant, if Required	10 acres	10	N/A	0
O&M Facility	5 acres	5	5 acres	5
Project Collection Substation[3]	5 acres	5	2.5 acres	2.5
Interconnection Switching Station[3]	5 acres	5	2.5 acres	2.5
One Permanent MET Tower	100-foot by 100-foot	0.2	40-foot by 40- foot	0.04
	TOTAL	**620.20**	**TOTAL**	**89.14**

1 Separate crane paths up to 40 feet wide may be required. Following completion of construction, any temporary crane paths will be removed, and the area restored pursuant to the contractual easement obligations.
2 Access road calculations are based on routes to 92 turbines and do not include access roads to alternate turbines.
3 Total impact may be overestimated due to overlap of components.

As discussed in Sections 7.0 through 16.0 of this Application, impacts to the physical environment, hydrologic resources, terrestrial and aquatic ecosystems and socioeconomic and community resources have been avoided or minimized during the siting and design of the Project. Furthermore, implementation of the mitigation measures identified in this Application will minimize potential impacts of the Project on all resources. Because of the measures that Triple H will implement measures to minimize the potential impacts of the Project on all resources, the construction and operation of the Project will not result in cumulative effects on resources in the area from siting the Project in combination with other energy conversion or major industrial facilities.

7.0 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.

7.1 Geological Resources

7.1.1 Existing Geological Resources

7.1.1.1 Regional Landforms/Physiography

The Triple H Project Area lies entirely within the Great Plains Province, the second largest physiographic province in the United States. The Great Plains span 450,000 square miles of flat high plains, bordered to the west by the Rocky Mountains and the east by the Central Lowlands (NPS 2018a).

The Project Area lies within the Coteau du Missouri division of the Great Plains Province. The Coteau du Missouri is a north-south trending 25 to 80-mile-wide highland extending through North and South Dakota. The James Basin division, located east and northeast of the Project Area, is approximately 500 feet lower in elevation that the Coteau du Missouri. Transition from the Coteau du Missouri to the James Basin is gradual. In Hyde County, this broad low area, called the Great Ree Valley, is bounded by the Orient Hills to the north and by the Ree Hills to the south. The Project Area is in south-central Hyde County in the Ree Hills. The Ree Hills have the highest elevation in the county with an elevation of 2,190 feet above mean sea level located south of the Project Area. The Project Area is located on a stagnation moraine of Wisconsin age with numerous closed small depressions (Helgerson and Duchossois 1987). The Missouri River Trench and Lake Sharpe impoundment of the Missouri River is located in extreme southwestern Hyde County with a normal pool level of 1420 mean sea level (Helgerson et al. 1987 and Lakes Online 2018). This represents a topographic variation in Hyde County of approximately 770 feet. Figure 4a (Appendix A) shows that the topographic relief within the Project Area ranges from approximately 1,830 to 2,060 feet above mean sea level, which represents a variation of approximately

230 feet (U.S. Geological Survey [USGS] 7.5-minute topographic quadrangles Chapelle Lake NW, Chapelle Lake and Macs Corner; USGS 2018a).

7.1.1.2 Surficial Geology

The surficial geology of Hyde County consists of late Wisconsin age glacial deposits, which form a mantle up to 500 feet thick over the Pierre shale bedrock and consist primarily of till and outwash. In Hyde and Hughes counties, these surficial deposits average 200 feet in thickness. Recent deposits include alluvial sediments in stream valleys and colluvium along the Coteau du Missouri escarpment. (Helgerson et al. 1987). Figures 4a through 4c (Appendix A) illustrates the surficial geology present within the Project Area, which consists of:

- Quaternary Alluvium (Qal): Contains clay- to boulder-sized clasts with locally abundant organic material reaching a thickness of up to 75 feet. Upper Wisconsin Outwash, valley train (Qlov): Consists of heterogeneous silt to gravel confined to valleys of glaciofluvial origin with thicknesses of up to 60 feet.
- Upper Wisconsin Ground moraine till (Qltg): Consists of a compact, silty, clay-rich matrix with sand- to boulder- sized clasts of glacial origin. A geomorphic feature that is characterized by smooth, rolling terrain. Composite thickness of upper Wisconsin till may be up to 300 feet.
- Upper Wisconsin Stagnation moraine till (Qlts): Consists of a compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin. A geomorphic feature that is characterized by hummocky terrain with abundant sloughs resulting from stagnation of ice sheets. Composite thickness of upper Wisconsin till may be up to 300 feet (Stoeser et al. 2005).

7.1.1.3 Bedrock Geology

Upper Cretaceous age Pierre shale is the shallowest bedrock encountered and ranges from 220 to 710 feet in thickness. The shale outcrops in the extreme southwest portion of Hyde County near the Missouri River. In the rest of Hyde County and in the Project Area, the shale lies beneath thick glacial deposits (Helgerson et.al 1987). Pierre shale is a blue-gray to dark-gray, fissile to blocky shale with persistent beads of bentonite, black organic shale, and light-brown chalky shale. it contains minor sandstone, conglomerate and abundant carbonate and ferruginous concretions (Tomhave and Schulz 2004).

7.1.1.4 Mineral Resources/Economic Deposits

Commercial mineral deposits within the Project Area are limited to sand, gravel, and construction aggregate enterprises. Information from the South Dakota Department of Environment and Natural Resources (SDDENR) Minerals and Mining Program mapping does not show any active sand and gravel sites within the Project Area (SDDENR 2018a). Four active sand and gravel sites are located 0.3 miles southwest of the Project Area, two operated by the Hyde County Highway Department and two by Morris, Inc (Figure 4a in Appendix A).

A review of the online information from the SDDENR Oil and Gas Initiative Program Geographic Information System (GIS) Website shows that the Project Area does not lie within an oil and gas field (SDDENR 2018b). The nearest identified oil and gas fields are the Lantry field in Dewey County, located approximately 100 miles northwest of the Project Area and the Faith field located in Meade County,

approximately 130 miles northwest of the Project (SDDENR 2018b). The nearest oil well is 7 miles west of the Project Area and is abandoned. No other active or historical economic mineral deposits have been identified within the vicinity of the Project.

7.1.1.5 Seismic Risks

The risk of seismic activity in the Project Area is extremely low to negligible. According to the U.S. Geological Survey (USGS; 2014 Seismic Hazard Map for the United States, a 2 percent chance exists for an earthquake to occur within the Project Area in the next 50 years (i.e., a recurrence interval of 2,500 years) that could result in a peak ground acceleration of between 6 percent of gravity (0.06 grams) and 8 percent gravity (0.80 grams). The USGS estimates a 10 percent chance exits for an earthquake to occur within the Project Area in the next 50 years (i.e. a recurrence interval of 475 years) that could result in a peak ground acceleration of between 1 and 2 percent gravity (Petersen et al. 2015). For reference purposes, 1 to 2.5 percent gravity earthquakes can be felt outdoors, sleepers are wakened, liquids are disturbed and possibly spilled, small unstable objects can be displaced or upset, doors swing open and closed and shutters and pictures move. Five to 10 percent gravity earthquakes can make it difficult to stand, is noted by car drivers, hanging objects quiver, some occur cracks in non-reinforced masonry, waves occur on ponds, small slides, and caving in can occur along sand or gravel banks, large bells ring and concrete culverts can be damaged (Seismic Research Centre 2018).

According to the South Dakota Geologic Survey (SDGS), one earthquake has been recorded in Hyde County from 1872 to 2013. This 4.4 Richter scale magnitude earthquake occurred on March 1983 (SDGS 2013). A review of the geologic mapping and information provided by the USGS Earthquake Hazards Program indicate that there are no active or inactive faults in the vicinity of the Project (USGS 2016a).

7.1.1.6 Subsidence Potential

The potential for subsidence within the Project Area is negligible. The Pierre Shale bedrock is buried beneath an approximate 80- to 300-foot-thick layer of glacial deposits across the Project vicinity (Helgerson et al 1987). Additionally, the bedrock does not exhibit karst topography or contain subsurface geologic layers or members that are identified as susceptible to dissolution by water (Schultz, Tourtelot, Gill and Boerngen 1980). Triple H is not aware of any documented historic underground mining operations within the Project vicinity, which could indicate a potential subsidence risk.

7.1.2 Impacts to Geological Resources

The geologic conditions within the Project Area are appropriate for the construction of the Project and will result in negligible impacts on geologic resources. Excavation, bearing, and groundwater conditions are anticipated to be conducive to construction and operation of the Project facilities. Excavation and trenching will be required to install the wind turbines and associated collection and communications systems. Triple H will also clear vegetation and grade construction workspaces, access roads and crane paths.

The depth to bedrock averages 200 feet in Hyde and Hughes counties (Halverson, et.al. 1987), therefore, excavation of 9 to 10 feet required for the installation of the wind turbines and collection and communication systems is unlikely to encounter or impact the underlying bedrock.

Operational impacts to bedrock or surface geology are limited to temporary impacts associated with maintenance activities that may require excavation. Given the limited potential for large, seismically induced ground movements, there is minimal risk of earthquake-related impacts on the Project.

Construction and operation of the Project will not interfere with the ongoing operation of the four sand and gravel pit operations located near the Project. The closest sand and gravel operation is located approximately 5,000 feet from proposed turbines (Figure 4a in Appendix A).

7.1.3 Mitigation Measures for Geological Resources

As discussed in Section 7.1.1.2, the Project is not anticipated to impact bedrock as the depths of excavation are shallower than the estimated depth of bedrock in the Project Area. Therefore, blasting is not anticipated.

It is not anticipated that the Project will negatively impact the sand and gravel operations in the Project Area. Triple H will work with local sand and gravel operators to supply materials for constructions.

Geologic hazards, such as seismicity, are considered to be extremely low to negligible in the Project Area. Given the limited potential for large, seismically induced ground movements, there is minimal risk of earthquake-related impacts on the Project. No additional mitigation beyond designing the Project to currently accepted industry specifications will be required.

7.2 Soil Resources

7.2.1 Existing Soil Resources

Soil characteristics within the Project Area were assessed using the Soil Survey Geographic Database (SSURGO; NRCS-USDA 2018). The SSURGO database is a digital version of the original county soil surveys developed by the Natural Resources Conservation Service (NRCS) for use with GIS. It provides the most detailed level of soils information for natural resource planning and management. The majority of the details were gathered at a scale of 1:12,000. Soil maps are linked in the SSURGO database to information about the component soils and their properties (NRCS-USDA 2018).

Table 7-1 lists the soil types located within the Project Area, which are also displayed on Figures 5a–5b (Appendix A).

Table 7-1. Soil Map Units within the Project Area

Map Unit Symbol	Map Unit Name	Slope Gradient	Acres in Project Area	Percent of Project Area
Bn	Bon loam, 0 to 2 percent slopes, rarely flooded	1	50.69	0.19
CrA	Cavo-Jerauld loams, 0 to 4 percent slopes	2	537.85	1.97
Cs	Cavo-Stickney loams	1	66.24	0.24
Df	DeGrey-Walke silt loams, 0 to 2 percent slopes	1	2991.37	10.98
Du	Dumps, mine	45	75.83	0.28
EpC	Eakin-Peno complex, 6 to 9 percent slopes	8	1664.05	6.11
ErA	Eakin-Raber complex, 0 to 2 percent slopes	1	672.18	2.47
ErB	Eakin-Raber complex, 2 to 6 percent slopes	4	4995.43	18.33
HdA	Highmore-DeGrey silt loams, 0 to 2 percent slopes	1	5527.59	20.29
HdB	Highmore-DeGrey silt loams, 2 to 6 percent slopes	4	2230.28	8.19
HeA	Haverson loam, 0 to 2 percent slopes, rarely flooded	1	410.29	1.51

Table 7-1. Soil Map Units within the Project Area

Map Unit Symbol	Map Unit Name	Slope Gradient	Acres in Project Area	Percent of Project Area
HeB	Haverson loam, 2 to 6 percent slopes	4	726.22	2.67
Ho	Hoven silt loam, 0 to 1 percent slopes	1	398.50	1.46
JsA	Jerauld-Slickspots complex, 0 to 4 percent slopes	2	51.58	0.19
Ma	Macken silty clay	1	76.09	0.28
Mb	Worthing silty clay loam, ponded, 0 to 1 percent slopes	1	254.71	0.93
OnA	Mobridge silt loam, 0 to 2 percent slopes	1	217.98	0.80
Os	Onita-Hoven silt loams	1	307.16	1.13
PgD	Peno-Gettys clay loams, 9 to 15 percent slopes	12	195.31	0.72
Pk	Peever-Tonka complex	1	560.83	2.06
RaB	Reeder loam, 2 to 6 percent slopes	4	0.53	0.00
RbC	Reeder loam, 6 to 9 percent slopes	8	0.88	0.00
RcA	Razor silty clay loam, 0 to 2 percent slopes	1	707.67	2.60
RcB	Reeder-Cabba loams, 3 to 6 percent slopes	5	2763.43	10.14
RpB	Regent-Ridgeview silty clay loams, 2 to 6 percent slopes	4	418.52	1.54
RpC	Regent-Wayden silty clay loams, 6 to 15 percent slopes	8	1186.80	4.36
Te	Tetonka silt loam, 0 to 1 percent slopes	1	64.57	0.24
W	Water	1	94.88	0.35
Totals			**27,247.5**	**100 %**

7.2.1.1 Prime Farmland

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating).

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate state agencies, typically in association with local soil conservation districts or other local agencies.

Approximately 62 percent of the Project Area is classified as not prime farmland and approximately 1 percent of the Project Area is classified as prime farmland (Table 7-2; Figures 5a–5b in Appendix A). Approximately 10 percent of the Project Area is classified as farmland of statewide importance. The remaining land within the Project Area is considered prime farmland if drained (2 percent) or prime farmland if irrigated (25 percent).

Table 7-2. Summary of Farmland Types Affected by the Project

Farmland Categorization	Acres in Project Area	Percent of Project Area	Construction Impacts (Temporary, Acres)	Operational Impacts (Long-Term, Acres)
Prime Farmland	268.7	1.0	3.6	0.6
Farmland of Statewide Importance	2,791.6	10.3	53.9	6.7
Not Prime Farmland	16,822.2	61.7	327.8	51.3
Prime Farmland if Drained	560.8	2.0	0.8	0.15
Prime Farmland if Irrigated	6,804.1	25.0	196.6	23.4

7.2.1.2 Drainage Class

The drainage class identifies the natural drainage condition of the soil. It refers to the frequency and duration of wet periods and provides a guide to the limitations and potentials of the soil for field crops, forestry, range, wildlife, and recreational uses. The class roughly indicates the degree, frequency, and duration of wetness, which are factors in rating soils for various uses (NRCS-USDA 2018). Approximately 81 percent of the Project Area is classified as well drained.

7.2.1.3 Erosion Potential

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 and the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The soils in the Project Area are moderately susceptible to erosion and have K factors ranging from 0.10 to 0.49, with the majority between 0.20 and 0.32.

A wind erodibility group consists of soils that have similar properties affecting their susceptibility to wind erosion. Soils assigned to group 1 are the most susceptible to wind erosion and those assigned to group 8 are the least susceptible. The soils in the Project Area have limited susceptibility to wind erosion, i.e. groups ranging from 4 to 8, with the majority being in group 6.

7.2.1.4 Steep Slopes

The slope gradient of a soil influences several characteristics such as the ability of a soil to retain water and the potential for accelerated erosion or subsidence (NRCS-USDA 2018). The slope gradient of a soil is used to assess soils with high water erosion potential and is a factor used to identify soils that may have revegetation concerns. Slopes in the Project Area range from 1 to 45 percent, with the majority of slope at 1 to 4 percent.

7.2.2 Impacts to Soil Resources

Construction activities such as clearing, grading, trench excavation and backfilling, as well as the movement of construction equipment within the construction workspace, may result in impacts to soil resources. Potential impacts on soil resources include soil erosion, soil compaction, reduction of soil fertility and changes to other soil characteristics. Clearing removes protective cover and exposes soil to the effects of wind and precipitation, which may increase the potential for soil erosion and movement of sediments into sensitive environmental areas. Grading and equipment traffic may compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. Contamination from release of fuels, lubricants and coolants from construction equipment could also impact soils. The majority of these impacts are temporary and related to construction activities; however, there will be long-term operational impacts associated with aboveground facilities.

Table 7-2 provides a summary of farmland types identified within the temporary and long-term operational footprints associated with aboveground facilities, such as the wind turbines, Project collection substation, interconnection switching station and long-term operational access roads. Land impacted by the installation of these facilities will be converted to impervious surfaces, thereby altering the soil composition at these locations.

7.2.3 Mitigation Measures for Soil Resources

Wind facilities are predominantly designed with turbines situated at higher elevations to minimize obstructions to wind. The current layout sites access roads away from steep slopes to the degree possible. The underground collector lines also avoid crossing steep ravines. Geotechnical soil borings will be conducted at wind turbine foundation locations prior to construction to determine the soil suitability to support turbine foundations. This information will help dictate final design parameters of the turbine and structure foundations.

Construction of the Project will require coverage under the SDDENR General Permit for Storm Water Discharges Associated with Construction Activities. To maintain compliance with provisions of this General Permit, Triple H will prepare a SWPPP to identify potential sources of stormwater pollution from the Project Area and specify best management practices (BMPs) to control erosion and sedimentation and minimize negative impacts caused by stormwater discharges from the Project. The SWPPP will be prepared prior to construction of the Project. The SWPPP will be implemented from the initiation of construction and used through site restoration efforts. Once construction has been completed, Triple H will backfill graded and excavated areas with the stored native material and return surface conditions to pre-construction conditions. During Project operation, stormwater volume, stormwater flow and erosion and sediment impact to surface water and groundwater resources are not anticipated to change from pre-construction conditions.

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8.0 EFFECT ON HYDROLOGY (ARSD 20:10:22:15)

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

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

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

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

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

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

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

8.1 Groundwater Resources

8.1.1 Existing Groundwater Resources

Depths to groundwater vary considerably in South Dakota. The Project is located in an area covered by glacial deposits that range up to 500 feet thick with an average thickness of 200 feet. These glacial deposits contain almost all of the shallow groundwater in areas east of Missouri River. Other sources of groundwater in this region are recent alluvial deposits along major rivers and their tributaries, ancient river channels buried beneath glacial deposits and bedrock (Agnew et al. 1959).

The Project Area is located within the Northern Great Plains aquifer system and underlies most of North Dakota and South Dakota, about one-half of Montana and about one-third of Wyoming. The major aquifers of the Northern Great Plains aquifer system are sandstones of Tertiary and Cretaceous age and carbonate rocks of Paleozoic age. These aquifers and the regional confining units that separate some of them, form one of the largest confined aquifer systems in the United States (USGS 1996). The Project is located within an area underlain by several confining units of the aquifer system.

The regional direction of flow in the deep confined aquifers follows long flow paths and is from southwest to northeast. Most of the recharge to the aquifer system is either from precipitation that falls on outcrop areas where the aquifers have been folded or faulted upward and subsequently exposed by erosion or from snowmelt that runs into streams that cross aquifer outcrops and seep downward through the stream beds into the aquifers. Some local recharge is by seepage of excess irrigation water. Much of the discharge from the aquifer system is through upward leakage of water into shallower aquifers where the hydraulic head in the shallower aquifer is less than that of a deeper aquifer (USGS 1996).

The SDDENR developed a detailed map that identifies the shallowest occurrence of aquifer material in Hyde County (Figure 6 in Appendix A; Rich 2012). This map indicates that the majority of the Project

Area is underlain by the Dakota Sandstone aquifer at depths below land surface ranging from 900 feet along the Missouri River to 1,750 feet in the south-central part of Hyde County (Rich 2012). The Dakota Sandstone consists of interbedded sandstone, siltstone and shale with a maximum thickness is approximately 300 feet. This aquifer is overlain by thick confining units consisting largely of shales, which due to their low permeability, limit the downward movement of water from the ground surface to the Dakota Sandstone aquifer. There are areas of shallow aquifer material, which consists of clay and silt with minor amounts of sand and gravel, in the southern portion of the Project Area along Chapelle Creek (Rich 2012). These areas are identified as alluvium deposits on the map and occur near the surface (Rich 2012).

A USGS study of aquifers in Hyde and Hand counties identified four glacial aquifers within Hyde County (USGS 1976). The only glacial aquifer to occur in the Project Area is the Highmore Aquifer. As mapped, the southernmost extent of this aquifer just reaches the northernmost edge the Project Area. The Highmore Aquifer underlies an area of approximately 100 square miles and may yield as much as 1,000 gallons of water per minute to wells ranging from 20 to 200 feet in depth. Water mostly occurs under artesian conditions except where it underlies the South Fork Medicine Knoll Creek. The depth to water in the wells us generally less than 100 feet below land surface (USGS 1976). The water is predominantly of calcium bicarbonate or sodium sulfate type with dissolved solids ranging from 500 to 2,000 milligrams per liter. It is suitable for domestic, stock, municipal and irrigation use (USGS 1976). In 2010, groundwater accounted for 54.2 percent of the total freshwater supply for the state, of which over 50 percent was used as irrigation (NGWA 2016).

8.1.2 Impacts to Groundwater Resources

Construction of the Project is not anticipated to have long-term impacts on groundwater resources. As discussed in Section 1.0, disturbances associated with Project construction activities are primarily limited to the upper 3 to 6 feet with excavations for turbine foundations reaching up to 10 feet, which are above the water table of most of the aquifers in the Project Area (Section 8.1.1). Construction activities such as trenching and backfilling and dewatering that encounter shallow surficial aquifers may result in negligible to minor short-term and very localized fluctuations in groundwater levels depending on the proximity and connectivity of groundwater and extent of the excavated area. Once the construction activity has been completed, the groundwater levels typically recover quickly.

Because wind turbines structures and their associated facilities are typically located at higher elevations where water tables tend to be deeper, minimal trench dewatering is anticipated. As discussed in Section 8.1.1, the Highmore aquifer is mapped as reaching the northmost edge of the Project Area. The introduction of contaminants into groundwater due to accidental release of construction related chemicals, fuels or hydraulic fluid during construction would have the potential to have an adverse effect on groundwater quality, most notably near shallow water wells (Section 8.1.2). Spill-related affects are primarily associated with fuel storage, equipment refueling and equipment maintenance.

Routine operation and maintenance are not expected to affect groundwater resources. During operations, potential, negligible to minor, short-term groundwater quality degradation is possible from maintenance equipment, vehicle spills and maintenance activities that may require excavation. Although there is potential for dewatering of shallow groundwater aquifers and potential changes in groundwater quality (such as increases in total suspended solids concentrations) during trenching, excavation and backfilling maintenance activities, these changes are expected to be temporary and short term. Shallow groundwater

aquifers generally recharge quickly because they are receptive to recharge from precipitation and surface water flow.

8.1.3 Mitigation Measures for Groundwater Resources

Given the depths of construction activities or up to 10 feet for turbine foundations, excavations are not likely to intercept the water table. If construction dewatering were to be required, it will be conducted in accordance with the General Permit for Temporary Discharge Activities (Permit No.: SDG070000) and Temporary Permit to Use Public Waters from the SDDENR and through the implementation of industry-accepted BMPs to minimize sediment withdrawal during dewatering activities and erosion and sediment release at the discharge point. Regarding potential impacts to wells, in the case that water supply wells are located near potential construction dewatering locations, provisions will be made to ensure that an adequate supply of water is provided until construction dewatering activities have ceased, if required

Project construction will require coverage under the General Permit Authorizing Stormwater Discharges Associated with Construction Activities (Permit No.: SDR10000), administered by the SDDENR. One condition of the permit is the development and implementation of SWPPP that identifies potential sources of stormwater pollution at the construction site and specifies the structural and non-structural controls that shall be in place to minimize the negative impacts to receiving waters caused by stormwater discharges associated with the construction activities.

On-site fuel storage will have secondary containment and will be inspected regularly, with containment being remediated promptly in accordance with the Project's SPCC Plan. Fuel handling activities and spill remediation will also adhere to the procedures outlined in the Project's SPCC Plan.

8.2 Surface Water Resources

The Project Area is situated along Chapelle Creek and south of South Fork Medicine Knoll Figure 7 (Appendix A). The Project Area is located within the Medicine Knoll and Fort Randall Reservoir Hydrologic Unit Code (HUC) 8 watersheds of the Fort Randall Reservoir HUC-6 watershed (USGS 2013). As noted in Sections 7.1 and 8.2, the Project Area is in south-central Hyde County in the Ree Hills, located on a stagnation moraine of Wisconsin age with numerous closed small depressions (Helgerson et al. 1987). The Ree Hills have the highest elevation in the county and are drained by South Fork Medicine Knoll, South Chapelle, Chapelle, Elm, Campbell, and West Fork Elm creeks (NRCS 1998).

The U.S. Army Corps of Engineers (USACE) has the authority to regulate the discharge of dredged and fill material into jurisdictional waters of the U.S (WoUS). Impacts to WoUS are reviewed, permitted, and mitigated through the Clean Water Act (CWA) Section 404 permitting process. The information provided in this section was compiled through desktop studies. A field investigation to delineate wetlands, watercourses and other waterbodies will be conducted in the spring of 2019 to confirm and characterize wetlands and other water resources where Project infrastructure (temporary and long-term operational) is proposed.

8.2.1 Existing Surface Water Resources

8.2.1.1 Waterbodies

The National Hydrography Dataset (NHD) represents United States drainage networks and related features, such as rivers, streams, canals, lakes, ponds, glaciers, coastlines, dams, and stream gauges (USGS 2018b). NHD waterbodies, a subset of these data, are mapped in Figure 7 (Appendix A). Some 144 NHD waterbodies, covering a total of 527 acres are located within the Project Area. Chapelle Lake, the largest named NHD waterbody feature within the Project Area, covers approximately 40 acres and is located in the southwest region of the Project. Section 10.0 addresses wildlife concerns within Chapelle Lake.

8.2.1.2 Watercourses

Watercourses can typically be categorized as perennial, intermittent, or ephemeral based primarily on the periods of time in which they hold flowing water. Perennial streams, while under normal conditions, have flowing water year-round. Conversely, an ephemeral stream's flow is typically limited to brief periods of time in response to rain events. Intermittent streams, therefore, can be described as somewhere in between the two other categories and normally possess flowing water during the wet season(s). All 55.8 miles of NHD watercourses within the Project Area are mapped as intermittent streams as shown on Table 8-1 and Figure 7 (Appendix A). Streams in the Project Area include Chapelle Creek and unnamed tributaries to South Fork Medicine Knoll Creek.

Table 8-1. NHD-Mapped Waterbodies in the Project Area

Stream Classification	Length in Project Area (Miles)
Intermittent	55.8
All Stream Types	**55.8**

8.2.1.3 Wetlands

Wetlands are defined in the USACE Wetland Delineation Manual, as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands have the following general diagnostic characteristics: hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987).

The Project Area lies within the 276,000-square-mile Prairie Pothole Region, which extends from Alberta, Saskatchewan and Manitoba, Canada, south into eastern North Dakota and South Dakota and extends east and south into Minnesota and Iowa. This region is defined by the abundance of shallow wetlands known as potholes, glacial potholes, kettles, or kettle lakes, which can be temporarily or semi-permanently inundated (Prairie Pothole Joint Venture 2005).

Triple H conducted desktop land cover analysis to identify potential wetlands in the Project Area (Appendix C). Wetlands and other WoUS within the Project Area were identified by reviewing digital National Wetlands Inventory (NWI) data as well as aerial imagery. According to NWI data (USFWS 2017), approximately 4.5 percent of the Project Area is mapped as wetland (Figure 8 in Appendix A). Wetlands within four vegetation classes, including those from the Palustrine (inland wetlands), Riverine (rivers) and Lacustrine (lake) Systems are located in the Project Area:

- **Palustrine Aquatic Bed Wetlands (PAB):** Plants that primarily grow on or below the surface of the water (i.e., submergents) are the uppermost life form layer with at least 30 percent areal coverage.
- **Palustrine Emergent Wetland (PEM):** Emergent plants (i.e., erect, rooted, herbaceous hydrophytes, excluding mosses and lichens) are the tallest life form with at least 30 percent areal coverage. Usually dominated by perennial plants. During wet years, these can become open water wetlands.
- **Riverine Intermittent (R4):** wetlands contained within a channel in which flowing water is only present for part of the year.
- **Lacustrine Littoral Aquatic Bed (L2AB):** A subsystem associated with lakes; extends shoreward from a depth in which non-persistent emergent vegetation grows and includes habitats where plants principally grow on or below the surface of the water.

The wetland classification and total area of wetland by type occurring with the Project Area are shown in Table 8-2.

Table 8-2. NWI-Mapped Wetlands in the Project Area

Wetland Type (Cowardin Class)	Area (acres)	Percentage
L2AB	161.4	0.6
PAB	218.0	0.8
PEM	828.7	3.0
R4	26.2	0.1
All Wetland Types	**1,234.3**	**4.5**

8.2.1.4 Floodplains

Floodplains perform many natural functions, including the storage of excess water and reduction of flow velocity during times of flood, groundwater recharge, provision of habitat and removal of excess sediment, nutrients, and other pollutants. The placement of fill into floodplains reduces the effectiveness of these functions. The Federal Emergency Management Agency (FEMA) maintains materials developed to support flood hazard mapping for the National Flood Insurance Program. Flood hazard mapping provides states, local communities and Tribes with flood risk information and tools that they can use to increase their resilience to flooding and better protect people and property through collaboration with state and local entities.

FEMA has not completed a study to determine flood hazard in Hyde County (FEMA 2018); therefore, a flood map for the Project Area has not been published at this time.

8.2.1.5 National Park Service Nationwide Rivers Inventory

Pursuant to Section 5(d) of the National Wild and Scenic Rivers Act, the NPS maintains the Nationwide Rivers Inventory (NRI), a listing of more than 3,400 free flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. The NRI includes river segments that potentially qualify as national wild, scenic, or recreational river areas (NPS 2017). Under a 1979 Presidential Directive and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that will adversely affect one or more NRI segments. There are no NRI-listed rivers within the

Project Area; the closest NRI segment listed is the White River in Lyman County, approximately 43 miles south of the Project Area (NPS 2018b).

8.2.1.6 Impaired Waters

CWA Section 303(d) requires that each state review, establish and revise water quality standards for all surface waters within the state. Waters that do not meet their designated beneficial uses because of water quality standard violations are listed as impaired. 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 of a pollutant that the water can receive and still safely meet water quality standards. There are no 303(d)-listed waterbodies within the Project Area (SDDENR 2018c).

8.2.2 Impacts to Surface Water Resources (ARSD 20:10:22:20)

8.2.2.1 Wetlands and Waterbodies

Turbines and the MET tower will be constructed on higher elevation portions of the Project Area to maximize the wind resource and as such, generally avoid direct impacts to wetlands and waterbodies, which tend to be in lower topographic positions. Prior to construction, Triple H will conduct wetland and waterbody delineations within the Project Area according to the USACE Wetlands Delineation Manual, Great Plains Regional Supplement (Environmental Laboratory 1987). Access roads, collector systems, O&M facility collection substation and interconnection switching station will be designed to avoid or minimize impacts to wetland and waterway features whenever feasible. Temporary impacts associated with crane paths will also be minimized. Installation of underground utilities is expected to avoid impacts by boring under water features as necessary and will minimize impacts to wetlands and waterbodies or where possible make them coincident with other impacts (e.g., crane paths). Where crossings of streams and drainageways cannot be avoided by access roads, appropriately designed crossings (i.e., culverts, low-water crossings) will be constructed to maintain existing drainage. Temporary impacts may also result from construction matting to access certain locations.

Triple H anticipates that there will be no long-term impacts on emergent wetlands. Any temporarily impacted wetlands will be restored to pre-construction conditions and the herbaceous vegetation will be allowed to vegetate naturally in these areas. The impacts on scrub-shrub wetlands and forested wetlands will be of a longer duration than emergent wetlands because the woody vegetation will require a longer time to reestablish in the construction workspace after restoration.

Construction of the Project will result in new impervious surfaces (turbine foundations, long-term operational access roads, interconnection substation, interconnection switching station, O&M facility) in the Project Area. The creation of impervious surfaces reduces the ability of soils to infiltrate precipitation to groundwater, potentially increasing the volume and rates of stormwater runoff. Infiltration will be inhibited within these newly created impervious surfaces and incremental increases in stormwater runoff may be exhibited immediately adjacent to these surfaces. Implementation of stormwater BMPs is anticipated to adequately mitigate any increases in runoff resulting from construction. In addition, the dispersed nature of the Project facilities will not provide enough of a concentration of increased impervious surfaces in any specific location to change drainage patterns. As such, the Project is not anticipated to cause significant changes in drainage and runoff patterns or volume.

Clearing and grading of stream banks, topsoil disturbance, in-stream trenching, trench dewatering, backfilling and development of access roads and crane paths could result in increased sedimentation and erosion, modification to hydrological flow, releases of chemical and nutrient pollutant from sediments and introduction of chemical contaminants such as fuel and lubricants. Coverage under the General Permit for Storm Water Discharges Associated with Construction Activities, administered by the SDDENR, will be required for the Project. Section 13.0 discusses the development and implementation of a SWPPP and BMPs in accordance with the General Permit. Erosion and sediment controls that will be implemented during Project construction and operation are expected to avoid negative impacts to water quality.

8.2.2.2 Floodplains

As discussed in Section 8.2.1.3, floodplains have not been mapped by FEMA in Hyde County. Although the federal government has not officially mapped floodplains in the county, it is unlikely the Project will impact floodplains. Wind turbines, transmission line structures, access roads, the O&M facility, the interconnection substation, and interconnection switching station will be located at higher elevations. If impacts to floodplains did occur, they will be temporary in nature and existing contours and elevations will be restored upon Project completion.

8.2.2.3 NRI-Listed Rivers

There are no NRI-listed rivers within the Project Area. Construction and operation of the proposed facility anticipates no impacts to these resources; therefore, no mitigation is required for impacts to NRI-listed rivers.

8.2.2.4 Impaired Waters

As of December 2018, there are no 303(d)-listed waterbodies within the Project Area. Construction and operation of the proposed facility anticipates no impacts to these resources; therefore, no mitigation is required for impacts to 303(d)-listed waterbodies.

Sections 8.0 and 13.0 discusses the development and implementation of a SWPPP and BMPs in accordance with General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR.

8.2.3 Mitigation Measures for Surface Water Resources

Wetlands and waterbodies will be avoided to the extent possible during the construction phase of the Project. If wetland or waterbody impacts cannot be avoided, Triple H will submit a permit application to the USACE for dredge and fill within WoUS under Section 404 of the CWA.

Project construction will require coverage under the General Permit Authorizing Stormwater Discharges Associated with Construction Activities (Permit No.: SDR10000), administered by the SDDENR. One condition of the permit is the development and implementation of SWPPP that identifies potential sources of stormwater pollution at the construction site and specifies the structural and non-structural controls that will be in place to minimize the negative impacts to receiving waters caused by stormwater discharges associated with the construction activities. The Project is not expected to cause significant changes to existing hydrology or stormwater runoff. Increased sedimentation and impacts to drainage patterns due to

stormwater runoff from the Project during construction and operation will be minimized by the use of BMPs. The use of BMPs during construction will minimize the delivery of sediment due to erosional processes and also control erosion and minimize sedimentation during precipitation events. To further protect wetlands and streams, BMPs for sediment and erosion control will be implemented. To limit the risk of contamination of wetlands and streams due to accidental spilling of fuels or other hazardous substances, construction equipment will be refueled in areas away from wetlands or drainage areas and a spill kit will be available at the construction site.

Construction dewatering will be conducted in accordance with the General Permit for Temporary Discharge Activities (Permit No.: SDG070000) and Temporary Permit to Use Public Waters from the SDDENR and through the implementation of industry-accepted BMPs to minimize sediment withdrawal during dewatering activities and erosion and sediment release at the discharge point. Regarding potential impacts to wells, in the case that water supply wells are located near potential construction dewatering locations, provisions will be made to ensure that an adequate supply of water is provided until construction dewatering activities have ceased.

8.3 Water Uses and Rights

8.3.1 Existing and Planned Water Uses and Rights

The Project Area is not incorporated in any rural water systems (SDARWS 2018). Triple H reviewed the SDDENR Water Rights and Well Completion Report databases to identify where there are existing water uses within the Project Area (SDDENR 2018d, e). Private wells that supply water for domestic and irrigation purposes are located throughout the Project Area. Water Right Permits are required for water use exceeding 25,920 gallons per day or a peak pump rate of 25 gallons per minute or for non-domestic uses regardless if it is appropriated from surface or groundwater resources. If appropriating from surface waters, a Water Rights Permit is required for dams that impound more than 25 acre-feet of water at the primary spillway elevation, diversions serve some use other than reasonable domestic use or the proposed dam is on a navigable stream.

There are no Water Rights Permits within the Project Area (SDDENR 2018d). Based on a review of the SDDENR Well Completion Report databases (SDDENR 2018e), there are 11 wells that are within the Project Area and one additional well (26084) located within 1,000 feet of the Project Area (Table 8-3).

Table 8-3. Wells Located within and in Proximity to the Project Area

Feature ID (FID)	Owner Name	T/R/S	Well Depth (feet)	Use Type
52473	Meek, Floyd	111N, 73W, S10	1850	Domestic
68831	Meek, Floyd	111N, 73W, S10	122	Test Hole
2922	DuBois, Wayne	111N, 73W, S15	2050	Domestic
61304	DuBois, Wayne	111N, 73W, S15	2040	Domestic
44246	Rittel, Arnold	111N, 73W, S1	2140	Domestic
34503	Alumbaugh, Donald	111N, 73W, S13	2110	Stock
50294	Baloun, Darwin	112N, 72W, S29	1625	Domestic
45127	Fed. Land Bank of Omaha	112N, 72W, S33	240	Domestic
32801	Cowan Brothers LLC	111N, 72W, S1	2160	Domestic
34422	Hoffman, Morris	111N, 72W, S11	200	Ground Heat Pump
5255	Pahl, Julias	111N, 72W, S1	1738.9	Domestic
26084	Dalton, Jay	111N, 72W, S14	45	Stock

1 T/R/S = Township / Range / Section; Source: SDDENR, 2017c

Based on a review of SDDENR's Pending Applications to Appropriate Water and Future Use Reviews, there are no pending water right applications in Hyde County (SDDENR 2018f).

8.3.2 Impacts on Current or Planned Water Uses

The Project will not appropriate from surface water in the Project Area and will not conduct permanent dewatering, deep well injection, water storage, reprocessing or cooling for either construction or operation of the facilities. Water required for dust control, and potentially for a concrete batch plant, is typically obtained from an existing or new well. Triple H will seek and comply with the conditions of the applicable permits for water appropriation.

Given the lack of a rural water supply for the O&M facility, a water supply well will be required for facility operations. Water usage at the O&M facility will be similar to a household volume. Triple H will seek and comply with the conditions of the South Dakota Water Right Permit for the water supply well. Additionally, a private wastewater treatment system will be needed for the O&M facility. This system will be developed to meet the requirements of the SDDENR. Water use associated with Project operations will be negligible and will not create undue burden, so no mitigation is proposed.

Potential construction-related impacts on wells could include localized decreases in groundwater recharge rates through changes to overland water flow, contamination, decreased well yields, decreased water quality (such as increased turbidity or odor in the water), interference with well mechanics or complete disruption of the well. These impacts could result from trenching, equipment traffic or hazardous materials spills. However, Triple H does not anticipate impacting residential domestic wells because wind turbines will be set back a minimum of 2,640 feet from non-participating residences and 1,540 feet from participating residences. Furthermore, excavation will only occur between 9 to 10 feet and known wells in the Project Area are generally drilled deeper than 45 feet (Table 8-3).

If required, construction dewatering will be conducted in compliance with South Dakota law. As stated above, residential domestic wells will not be impacted by construction dewatering due to the minimum setback of 2,640 feet from non-participating residences and 1,540 feet from participating residences.

The Project will have no impact on surface water availability or use for communities, agriculture, recreation, fish or wildlife. As discussed in Section 8.2.2.1, the Project anticipates minimal impacts to wetlands and waterbodies. Following construction, temporary impacts to wetlands and waterbodies will be restored to pre-construction conditions.

8.3.3 Mitigation Measures for Existing and Planned Water Uses and Rights

In the case that water supply wells are located near potential construction dewatering locations, provisions will be made to ensure that an adequate supply of water is provided until construction dewatering activities have ceased. These impacts are expected to be minor and temporary. Surface water availability for communities, schools, agriculture, recreation, fish or wildlife will not be impacted.

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9.0 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.*

This section discusses the existing terrestrial ecosystem, the Project's potential impacts to it and potential avoidance, minimization, and mitigation techniques to minimize impacts. Terrestrial ecosystem wildlife and vegetation data was identified and gathered through literature searches, federal and state agency reports and consultations, natural resource databases and field studies. Biologists from Western Ecosystems Technology, Inc (WEST) conducted field surveys on behalf of Triple H within and surrounding the Project Area to provide site-specific information on terrestrial resources. The results of these surveys are summarized in the vegetation and wildlife sections below.

9.1 Vegetation

9.1.1 Existing Terrestrial Ecosystem

The Project Area is located within the Northwestern Glaciated Plains Level III Ecoregion, an area characterized by significant surface irregularity and high concentrations of seasonal and semi-permanent wetlands (prairie potholes). Historically dominated by grasslands composed of grama, needlegrass and wheatgrass, land use in the Northwestern Glaciated Plains ecoregion is now dominated by rangeland, haycrop and row crop agriculture used for growing corn, soybeans, sunflowers, and sorghum. In addition to direct conversion of the native ecosystem, human activity has also altered or interrupted the natural disturbance processes of this ecosystem. Through the suppressing of fire and alteration of historical grazing practices (relative to historical bison herd grazing), invasive plants and woody plants not part of the grassland ecosystem have been able to take root and out-compete the grassland-obligate vegetation (SDGFP 2014).

Based on desktop review completed by WEST, land cover types were digitized using GIS within the Project Area. Using USDA National Agriculture Imagery Program (NAIP [USDA 2016]) aerial imagery in combination with 2011 South Dakota Land Cover Patterns (NLCD; USGS, NLCD 2011, Homer et al. 2015), and U.S. Department of Agriculture National Agricultural Statistics Service (NASS) National Cropland Layer (USDA NASS 2017) cropland classification, and field inspections, all lands within the current Project were digitized and assigned one of six cover types (excluding NWI wetlands). NWI data was used to represent water within the current Project area. Those water features visible on the aerial imagery but not in the NWI data were digitized as "water".

Based on this desktop review (Appendix C), approximately 63 percent of the Project Area is mapped as cultivated cropland and approximately 26 percent is mapped as grassland pasture. Croplands included fields where corn (*Zea mays*), soybeans (*Glycine max*), sunflowers (*Helianthus annuus*), sorghum (*Sorghum bicolor*), alfalfa (*Medicago sativa*), winter wheat (T*riticum aestivum*), or other row crops were

grown. Herbaceous grassland vegetation was divided into grassland pastures or grass hay. Grassland pastures typically were characterized by a mixture of native cool and warm season grasses including western wheatgrass (*Pascopyrum smithii*), green needle grass (*Nassella viridula*), needle-and-thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), and little blue stem (*Schizachyrium scoparium*). Grass hay fields typically contained fewer species such as smooth brome grass (*Bromus inermis*) and intermediate wheatgrass (*Thinopyrum intermedium*) and could possibly have been older Conservation Reserve Program (CRP) fields that were hayed in 2017. Trees typically included shelterbelts with a mixture of evergreen and deciduous species, near residences or along field borders. Developed lands included roads, ranches and residential areas, feed lots, and stock yards.

This particular classification activity does not differentiate between potential native grasslands and areas where soils have been manipulated and/or introduced grasses have been planted. Other digitized land cover within the Project Area includes NWI wetlands, grass hay, developed, trees and water (Table 9-1).

Table 9-1. WEST-Digitized Land Cover within the Project Area

Land Cover Type	Acres	Percent of Project Area
Cropland	17,073.8	62.7%
Grassland Pasture	7,032.6	25.8%
NWI Wetlands	1,671.6	6.1%
Grass Hay	701.5	2.6%
Developed	516.8	1.9%
Trees	251.1	0.9%
Water	0.1	<0.1%
Total	**27,247.5**	**100.0%**

Cropland and Developed land uses are discussed further in Section 11. See Section 8.2.1.3 for a detailed discussion of NWI wetlands mapped within the Project Area.

9.1.1.1 Grasslands

Grasslands are important and valuable communities, providing habitat to a diverse range of taxa, including highly specialized, habitat-specific birds, rare and economically-important pollinators, and a wide range of mammals. Once covering millions of acres across North America, it is estimated by some that mixed grass prairies have declined by 68 percent (Banchard 2001). Aside from direct impacts, the primary concern associated with turbine development in grasslands is habitat fragmentation created by the development of access roads. Fragmented habitat not only supports edge-generalist species such white-tailed deer (*Odocoileus virginianus*) and American robins (*Turdus migratorius*), but simultaneously deters many species that require large areas of undisturbed land to breed (NDGF 2018).

Based on WEST data, 25.8 percent (7,032.6 acres) of the Project Area is mapped as grassland pasture. However, these data do not distinguish between untilled, native grassland and other pasture land, fallow fields, or similarly vegetated areas. Instead, a GIS layer created by South Dakota State University (SDSU) to quantify undisturbed grasslands of eastern South Dakota was utilized (Bauman, Carson, and Butler 2016). Based on the data, approximately 8,156 acres of potentially undisturbed grassland are present within the Project Area. Because this GIS layer was created based on a tiered, desktop analysis, it remains likely that some areas mapped as "potential native grassland" have, in fact, been tilled. As an example, in the spring of 2018, a landowner broke ground on two fields (approximately 240 acres) where

"undisturbed grasslands" occurred. One of the fields is where a greater prairie chicken lek as located (Lek 4).

Within the Project Area, 5,582 acres of the land is under easement with USFWS to protect the grasslands and native prairie (Figure 9).

9.1.1.2 Noxious and Invasive Weeds

Noxious and invasive weeds are regulated by state (SDCL 38-22) and federally (7 Code of Federal Regulations [CFR] 360) rules and regulations designed to stop the spread of plants that are detrimental to the environment, crops, livestock, and/or public health. According to the South Dakota Department of Agriculture (SDDOA), 11 listed species of noxious weeds have the potential to occur and are regulated within Hyde County (SDDOA 2018a and 2018b). Three of these species are listed statewide and the remaining eight species are locally listed for Hyde County (Table 9-2).

Table 9-2. State and Local Noxious Weeds of South Dakota

Common Name	*Scientific Name*	State Weed Status
Absinth wormwood	*Artemisia absinthium*	Local noxious weed
Bull Thistle	*Cirsium vulgare*	Local noxious weed
Common mullein	*Verbascum Thapsus*	Local noxious weed
Field bindweed	*Convolvulus arvensis*	Local noxious weed
Houndstongue	*Cynoglossum officinale*	Local noxious weed
Plumeless thistle	*Carduus acnthoides*	Local noxious weed
Musk thistle	*Carduus nutans*	Local noxious weed
Yellow toadflax	*Linaria vulgaris*	Local noxious weed
Canada thistle	*Cirsium arvense*	State noxious weed
Leafy spurge	*Euphorbia esula*	State noxious weed
Perennial sow thistle	*Sonchus arvensis*	State noxious weed

9.1.1.3 Forest and Woodlands

Based on WEST data, the land cover Trees classification comprises approximately 0.9 percent or 251.1 acres, of the Project Area. Typical trees include shelterbelts with a mixture of evergreen and deciduous species located along field borders and near residences. As part of the Northern Long-eared Bat (NLEB) Habitat Assessment (Appendix C), WEST conducted a desktop assessment of potential suitable habitat, which included deciduous forest, evergreen forest, mixed forest, and woody wetlands. Two forested areas greater than 15 acres in size were mapped within the Project Area. A discussion regarding the NLEB Habitat Assessment can be found in Section 9.2.1.3.

9.1.2 Impacts to Vegetation

The Project will result in long-term operational impacts to approximately 82 acres of vegetation and temporarily impact approximately 583 acres of vegetation. Table 9-3 identifies the acreages of WEST-digitized land cover classes that will be directly affected by construction and operation of the Project. Overall, 79 percent of the Project's construction and operations related impacts will occur in vegetation types that have experienced prior disturbance or alteration, including Cropland, Grass Hay and Developed land cover types.

Long-term operational impact acreages provided in Table 9-3 refer to locations where vegetation will be removed and replaced by wind turbine foundations, MET towers, O&M facility, collector substation, transmission poles, long-term operational access roads and the interconnection switching station.

Table 9-3. Summary of Impacts to WEST-Digitized Land Cover

Landcover Type	Long-Term Operational Impacts (acres)	Temporary Construction Impacts (acres)
Cropland	46.7	360.5
Grassland Pasture	22.6	179.3
NWI Wetlands	0.3	3.2
Grass Hay	7.0	24.8
Developed	5.6	14.3
Trees	--	0.5
Project Total	82.2	582.6

1 Estimated value; impact value does not include features not yet sited including the batch plant or O&M facility.

9.1.2.1 Grasslands

Based on the WEST-digitized land cover classification, Project construction activities have the potential to impact vegetation categorized as grassland pasture (Table 9-3). A subset of this category, areas of potentially undisturbed grassland, as mapped by SDSU described in 9.1.1.1. of this Application could be impacted.

The Project has been designed to avoid impacts to USFWS grassland easements and the delineated features associated with the USFWS wetland easement program. Four turbines and associated access roads and collector lines are located on easements that were "top leased" with USFWS grassland easements (Figure 9 in Appendix A). The phrase "top leased" is refers to the circumstance in which a lease is executed covering land upon which a current lease already exists. In this instance, Triple H easements were in place prior to the USFWS grassland easements. The South Dakota state law principle of "first in time - first in rights" applies here. As a result, the Project easements are superior to the USFWS grassland easements in the identified "top leased" areas. Based on discussions with USFWS (Appendix N), the agency understands and agrees that the Triple H easements will take precedent because they were in-place before the USFWS grassland easements. As a result, National Environmental Policy Act (NEPA) will not be triggered due to Triple H placing the four turbines and associated roads and collector lines on the "top-leased" lands. The USFWS grassland easement program is further discussed in Section 11.2.1.4.

Other areas, such as tilled, degraded grasslands dominated by non-native vegetation are anticipated to be impacted during construction. Impacts will likely be both short-term (i.e., collector lines or temporary road construction) and long term (i.e., turbine foundations, turbine access roads) in nature.

9.1.2.2 Noxious and Invasive Weeds

Noxious weeds have the potential to spread through a variety of mechanisms. They are often carried on vehicles' undercarriage and tires and thrive in highly disturbed areas, rapidly out-competing native vegetation- particularly when exposed soil conditions are present (Sheley 2011). Areas of disturbance due to construction will occur in the Project Area and it is anticipated that concentrated pockets of noxious and invasive weed populations are present. With construction activities potentially taking place nearby, the threat of these species spreading via work crews, vehicles or other vessels exists.

9.1.2.3 Forest and Woodlands

Areas mapped as trees in the Project Area include shelterbelts with a mixture of evergreen and deciduous species, typically located along field borders and near residences. As demonstrated in Table 9-3, Triple H has avoided impacts to the two forested areas greater than 15 acres in size that occur within the Project Area near Chapelle Lake marked as potential NLEB habitat, (Appendix C) by more than 1,000 feet. No major tree clearing activities will take place.

9.1.3 Mitigation Measures for Vegetation

9.1.3.1 Grasslands

Triple H has worked SDGFP to redesign the site layout to minimize impacts to native grassland areas, as identified by the SDSU data layer. Best efforts were made to utilize cropland for turbine placement and existing disturbed corridors (e.g., roads, transmission lines, fence rows) to reduce habitat fragmentation and direct impacts to the vegetation. Turbines placed within areas mapped by SDSU as potentially undisturbed land will be inspected for signs indicative of past disturbance or tillage by a qualified biologist in order to determine if these areas are undisturbed grasslands. In areas where impacts to undisturbed grasslands cannot be avoided, Triple H will employ BMPs such as revegetation and erosion control measures and will restore areas of disturbed soils as soon as possible after construction activities have been completed.

9.1.3.2 Noxious and Invasive Weeds

Triple H will develop and implement a Noxious and Invasive Weed Management Plan that will identify and establish the procedures to prevent the introduction and spread of noxious and invasive weeds during construction and ongoing operations. This plan will be based on the construction schedule and the potential for weeds to be spread during that timeframe. During restoration, Triple H will utilize seed mixes free of noxious and invasive weeds. Triple H will coordinate with SDGFP, USFWS, USDA NRCS and landowners on seed mixes to be used during restoration. Therefore, the Project may have a beneficial impact in the Project Area by reducing and controlling the spread of noxious and invasive species that are already present.

9.2 Wildlife

The USFWS has developed a series of guidance documents, the Land-Based-WEG (USFWS 2012) and the Eagle Conservation Plan Guidance (ECPG; USFWS 2013a), to provide a structured, scientific process for addressing wildlife conservation concerns.

9.2.1 Existing Wildlife

9.2.1.1 Initial Site Assessment

In accordance with WEG Tiers 1 and 2, a landscape-level site analysis was conducted utilizing desktop resources to identify potential sensitive species or habitats that could be located near the Project. Resources reviewed included South Dakota Natural Heritage information, SDGFP Wildlife Action Plan, USFWS Information, Planning and Consultation (IPAC), NLCD mapping, aerial imagery, eBird, USGS Breeding Bird Survey (BBS), NatureServe and USGS Gap data, among other sources.

Wildlife species associated with grasslands and tilled agricultural landscapes are expected to be the most common species within the Project Area. Note that since the time of the Tier 2 Site Characterization Study (Appendix D), the Project Area has shifted. This a typical occurrence, as one purpose of the WEG studies is to adjust boundaries as better information becomes available. Figure 10 (Appendix A) shows the original 2016 Project Area was expanded in 2017. Following the 2017 expansion, the Project Area was then contracted into the current Project Area. The current Project Area is limited to Hyde County but extends outside of the bounds of portions of the 2016 Project Area.

Migratory Birds

The Migratory Bird Treaty Act (MBTA) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. Under the MBTA, it is illegal "to pursue, hunt, take, capture, kill … possess, offer for sale, sell … purchase … ship, export, import …transport or cause to be transported… any migratory bird, any part, nest or eggs of any such bird …" (16 United States Code [USC] 703). The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect" (50 CFR 10.12). The USFWS maintains a list of all species protected by the MBTA at 50 CFR This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds and passerines (USFWS 2015d). A December 22, 2017 memorandum from the U.S. Department of the Interior's Office of the Solicitor clarified that the prohibitions of take under the MBTA apply only to "affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs". An April 11, 2018 memorandum from the USFWS provided guidance to "clarify what constitutes prohibited take". The USFWS memo stated that the "take of birds, eggs or nests" was not prohibited when the purpose of the activity was not to conduct take.

In an effort to characterize potential use of the Project Area by breeding birds, the two nearest USGS BBS routes, the Crow Creek BBS, and Fort Thompson BBS, were analyzed. Each route is approximately 24.5 miles (39.4 kilometer [km]) long, with survey points located every half-mile. Standard survey protocol dictates that all birds seen or heard are tallied for a 3-minute period at each point along the route.

From 2011 to 2014, 86 bird species were recorded along the two BBS routes (Pardieck, Ziolkwski and Hudson 2015). In 2011, 2,242 individual birds of 80 species were observed along the two routes surveyed (1,146 individuals of 65 species in Crow Creek and 1,096 birds of 53 species in Fort Thompson). The most abundant species observed were the brown-headed cowbird (*Molothrus ater;* 290 individuals), western meadowlark (*Sturnella neglecta;* 244 individuals), common grackle (*Quiscalus quiscula;* 196 individuals), dickcissel (*Spiza americana;* 174 individuals), red-winged blackbird (*Agelaius phoeniceus;* 156 individuals), mourning dove (*Zenaida macroura;* 134 individuals) and cliff swallow (*Hirundo rustica;* 108 individuals).

Raptors

Following a desktop assessment of potential raptor roosting habitat, prey base and species distributions, a total of 16 diurnal raptors, one vulture and six owls were determined to have the potential to occur within the Project Area. Of these species, one vulture (*Cathartiformes*), five species of diurnal raptors and five species of owls (*Strigiformes*) have the potential to nest near or within the Project Area (Table 9-4). Within the Project Area, trees and woodland areas occur around wetlands, streams, and houses, providing potential nesting opportunities for many of these species. Raptors may also nest on man-made structures, such as power poles associated with power lines and structures associated with transmission lines, both of

which are present in the Project Area. Ground-nesting raptors may nest in the grassland areas located throughout the Project Area.

The remaining 12 species are all potential visitors during migration, winter, or post-breeding dispersal (Jennings, Cable and Burrows 2005). Several factors influence the migratory pathways of raptors, the most significant of which is geography. Two geographical features used by raptors during migration are ridgelines and shorelines of large bodies of water (Liguori 2005). The up-drafts formed as the wind hits the ridges and thermals created over land (but not water) make for energy -efficient travel for raptors over long distances (Liguori 2005). It is for this reason that raptors often follow corridors or pathways (e.g., along prominent ridges with defines edges) during migration. Topography in the Project Area is relatively flat to gently rolling hills and none of the features of the Project Area are likely to concentrate raptors. However, the Project Area is located within the Central Flyway avian migratory corridor used by raptors and wetland and water impoundments may provide some stopover and/or foraging habitat for raptors that migrate through the area.

Specific foraging habitat that could attract both migrating and breeding raptors include grassland areas that are utilized by the likes of prairie dogs and other small colonial mammals. Black-tailed prairie dog (*Cynomys ludovicianus*) towns, which were documented within the Project Area during aerial raptor nest surveys, provide hunting opportunities for eagles and several raptor species likely to occur within the Project Area, including the ferruginous hawk (*Buteo regalis)*, red-tailed hawk *(Buteo jamaicensis)*, northern harrier *(Circus cyaneus)* and Swainson's hawk *(Buteo swainsoni)*.

Table 9-4. Raptors with Potential to Occur within Project Area

Species	Scientific Name	Nesting Potential
Diurnal Raptors (*Accipitriformes* and *Falconiformes)*		
American Kestrel	*(Falco sparverius)*	X
Bald Eagle	*(Haliaeetus leucocephalus)*	X
Broad-Winged Hawk	*(Buteo platypterus)*	
Cooper's Hawk	*(Accipiter cooperii)*	
Ferruginous Hawk	*(Buteo regalis)*	X
Golden Eagle	*(Aquila chrysaetos)*	X
Merlin	*(Falco columbarius)*	
Northern Goshawk	*(Accipiter gentilis)*	
Northern Harrier	*(Circus cyaneus)*	X
Osprey	*(Pandion haliaetus)*	
Peregrine Falcon	*(Falco peregrinus)*	
Prairie Falcon	*(Falco mexicanus)*	
Red-Tailed Hawk	*(Buteo jamaicensis)*	X
Rough-Legged Hawk	*(Buteo lagopus)*	
Sharp-Shinned Hawk	*(Accipiter striatus)*	
Swainson's Hawk	*(Buteo swainsoni)*	X
Owls (*Strigiformes*)		
Burrowing Owl	*(Athene cunicularia)*	X
Eastern Screech-Owl	*(Megascops asio)*	X
Great Horned Owl	*(Bubo virginianus)*	X
Long-Eared Owl	*(Asio otus)*	X
Northern Saw-Whet Owl	*(Aegolius acadicus)*	
Short-Eared Owl	*(Asio flammeus)*	X
Vultures (*Cathartiformes*)		
Turkey Vulture	*(Cathartes aura)*	X

Prairie Grouse

The Project Area occurs within the occupied range of the greater prairie-chicken (*Tympanuchus cupido*) and sharp-tailed grouse (*T. phasianellus)* hereafter referred to as prairie grouse for both species combined (Sibley 2014). These two species of gamebirds are native to the Great Plains of North America and thus prefer large expanses of grasslands with tall residual grass or shrubs that can provide cover while nesting and short or sparse grass on slightly elevated ground for leks (area where prairie grouse congregate during spring for mating), which provides maximum visibility for female grouse while simultaneously enabling a clear view of avian and mammalian predators. Areas with tall structures such as trees are generally avoided due to perceived vulnerabilities associated with perching raptors (Johnson, Schroeder, and Robb 2011; Connelly, Gratson and Reese 1998). Surveys conducted in 2016 and 2018 by WEST verified the presence of prairie grouse leks within and surrounding the Project Area (Section 9.2.1.3). The Project Area is outside of the range for the greater sage-grouse (*Centrocercus urophasianus*).

Bats

Based on range maps (BCI 2015; USGS 2016b), eight bat species are possible residents and/or migrants in the Project Area (Table 9-5). One of the eight species are included due to range (BCI 2015) but is unlikely to occur in the Project Area based on habitat restrictions: the Townsend's big-eared bat (*Corynorhinus townsendii*). Six of the seven remaining species that have potential to occur in the Project Area based on range maps (Table 9-5) have been documented as fatalities at wind energy facilities. These species include big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*) and silver-haired bat (*Lasionycteris noctivagans*). The species that was not documented was the western small-footed myotis (*Myotis cilioabrum)* (American Wind Wildlife Institute 2018).

Table 9-5. Bat Species with the Potential to Occur in the Project Area Based on Range Maps

Species	Scientific Name	Habitat	Likelihood of Occurrence
Big Brown Bat	*Eptesicus fuscus*	Common in most habitats; abundant in deciduous forests and suburban areas with agriculture; maternity colonies beneath bark or in tree cavities, buildings, barns, or bridges.	Probable
Eastern Red Bat	*Lasiurus borealis*	Abundant tree bat; roosts in trees; solitary, prefers forested environments	Probable
Hoary Bat	*Lasiurus cinereus*	Usually not found in human-made structures; roosts in trees along forest borders; very wide-spread. Found in a wide variety of habitats.	Probable
Little Brown Bat	*Myotis lucifugus*	Especially associated with humans, often man-made structures for nursery colonies. Roost in tree cavities and crevices and forage over meadows, farmland and cliff faces.	Probable
Northern Long-Eared Bat	*Myotis septentrionalis*	Found roosting beneath exfoliating bark and in tree cavities. Hibernates in caves and underground mines.	Possible
Silver-Haired Bat	*Lasionycteris noctivagans*	Common bat in forested areas, particularly old growth forest; maternity colonies in tree cavities or hollows; hibernated beneath exfoliating bark, in wood piles and in cliff faces.	Probable
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	Commonly found in arid desert scrub and pine forests; maternity colonies in mines, caves, and buildings	Unlikely
Western Small-Footed Myotis	*Myotis ciliolabrum*	Hibernated in caves or mines. Rears young in cliff-face crevices, erosion cavities and beneath rocks on the ground.	Possible

9.2.1.2 Special Status Species

Federally-Listed Species

Six wildlife species listed as federally threatened or endangered under the Endangered Species Act (ESA 1973) have been verified to occur or have the potential to occur in Hyde County (USFWS 2016f). This includes four federally listed avian species, one federally listed bat species and one federally listed fish species (Table 9-6; USFWS 2016f). These six species are described Table 9-6.

Table 9-6. Federally Threatened or Endangered Wildlife Species with the Potential to Occur in the Project Area

Species	Scientific Name	Federal Status	Likelihood of Occurrence
Mammals			
northern long-eared bat	*Myotis septentrionalis*	T	Possible
Birds			
whooping crane	*Grus americana*	E	Possible
red knot	*Calidris canutus rufa*	T	Unlikely
interior least tern	*Sternula antillarum athalassos*	E	Possible
piping plover	*Charadrius melodus*	T	Possible
Fish[1]			
Pallid sturgeon	*Scaphirhynchus albus*	E	No occurrence

Federally endangered (E), threatened (T) and candidate species (C)
Sources: Jennings et al. 2005; USFWS 2016f
1 See Aquatic Resources Section 10.1.2 for discussion

Northern Long-eared Bat

The northern long-eared bat is found in the United States, from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through part of South and North Dakota (USFWS 2016b). This species hibernates in caves and abandoned mines during winter. During the summer, individuals may roost alone or in small colonies beneath exfoliating bark or in cavities or crevices of both live and dead trees (BCI 2015).

South Dakota contains 21 known northern long-eared bat hibernacula, all within the Black Hills, in western South Dakota, nine of which are abandoned mines (USFWS 2015a). Northern long-eared bats, including some pregnant females, have been captured during the summer along the Missouri River in South Dakota (Swier 2006, Kiesow and Kiesow 2010). Acoustic data recorded by bat monitoring stations operated by the SDDGFP also detected the northern long-eared bat sporadically throughout the state (across 16 counties) in 2011 and 2012 (USFWS 2015a).

Under the final Section 4(d) rule, incidental take of northern long-eared bat is prohibited near a hibernaculum, if it results from tree removal activities within 0.25-mile (0.4 km) of a known hibernaculum or results from tree removal activities that the activity cuts or destroys a known, occupied maternity roost tree or other trees within a 150-foot radius from the maternity roost tree during the pup season from Jun 1 through July 31 within the USFWS White Nose Syndrome (WNS) zone, which includes all counties affected by WNS and an additional 150-mile (241 km) buffer around these counties (USFWS 2017b). Lethal take by operating wind turbines is specifically excluded from this prohibition. As documented by the WNS Response Team (2018), the nearest county to confirm WNS is Custer

County, South Dakota, approximately 156 miles (252 km) to the southwest of the Project area. The nearest county with suspected WNS is Jackson County, South Dakota, approximately 76 mi (122 km) southwest of the Project Area. The Project Area is also located within the estimated range for the species (USFWS 2016c) and, as evidenced during site visits, suitable habitat features in the form of tall trees, abandoned buildings, riparian areas and caves are present throughout and near the Project Area. Although WNS (caused by the fungus *Pseudogymnoascus destructans*) is the primary threat to northern long-eared bat populations (USFWS 2016c), there is additional concern about the impacts of wind facilities on bat species.

Whooping Crane

The whooping crane (*Grus americana*) is a federally and state endangered migratory species that prefers stopovers in croplands interspersed with palustrine wetlands (USFWS 2016d). The only self-sustaining wild population, with an estimated 505 whooping cranes (including 49 juveniles and 183 adult pairs) as of the winter of 2017-2018, over-winters in the Texas Gulf Coast at the Aransas National Wildlife Refuge (USFWS 2018b). The cranes then migrate north through Oklahoma, Kansas, Nebraska, and the Dakotas to breed in the Northwest Territories of Canada (USFWS 2016e). Each spring and fall, 95 percent of whooping crane sightings occur within a 180-mile (289-km) wide migration corridor along this route (Stehn 1998). The Project Area is within the 50 percent migration corridor (Pearse, Brandt, Rabbe, and Bidwell 2019).

Whooping cranes occasionally migrate with sandhill cranes (*Grus canadensis*), so stop-over sites used by sandhill cranes may be used to identify potential whooping crane stop-over areas (CWS and USFWS 2007). The Project Area provides potentially suitable habitat for both sandhill and whooping crane species as it is primarily composed of herbaceous cover and cropland with interspersed streams and areas of open water. Although no whooping crane sightings have been documented within the Project Area, there have been eight confirmed sightings between 1991 and 2011 within 10 miles (16 km) of the current Project Area (Cooperative Whooping Crane Tracking Project [CWCTP] 2016) (Figure 11 in Appendix A). In the spring of 2010, during crane monitoring at the Titan I Wind Facility in Hand County, approximately 6 miles (9.25 km) northeast of the Project Area, a group of five whooping cranes spent three days approximately 2 miles (3.22 km) from the Project. The closest they ever were on the ground from a turbine was 1.2 miles (2 km; Stehn 2011).

Whooping cranes generally migrate at 1,000 to 5,000 feet (305-1,524 m), altitudes well above turbine height (Stehn and Wassenich 2007); thus, for the most part, whooping cranes are unlikely to collide with turbines. However, whooping cranes ascend and descend during landing or in inclement weather, they may fly at lower altitudes, sometimes within rotor swept areas.

Red Knot

The rufa red knot (*Calidris canutus rufa*) is a federally listed threatened shorebird species that breeds in the tundra of the central Canadian Arctic and winters in Tierra del Fuego at the southern tip of South America (USFWS 2015b). Outside of its breeding grounds, it uses marine habitats such as estuaries and bays (USFWS 2015b). The red knot is a potential but infrequent migrant through the Project Area during spring and fall, however, potential of occurrence within the Project area is considered unlikely given the lack of confirmed observations in the region (eBird 2019) and lack of suitable stopover habitat within the Project Area.

Interior Least Tern

The federally and state endangered interior least tern (*Sternula antillarum athalassos*) breeds along barren areas near water such as riverine inter-channel sandbars, salt marshes or salt flats (NatureServe 2016a). These birds prefer open habitat and tend to avoid thick vegetation and narrow beaches. Favorable nesting habitat includes sand and gravel bars within a wide unobstructed river channel or open flats along shorelines of lakes and reservoirs, away from disturbed areas and near plentiful sources of small fish, although they will forage up to 12 km (7.5. miles) from their nests (USFWS 2015c, NatureServe 2016a). Ideal foraging areas include shallow water regions of lakes, ponds, and rivers (USFWS 2013b, NatureServe 2016a).

Least terns may occur anywhere in Hyde County during migration and breed along the Missouri River. Although no suitable nesting habitat was identified within the Project Area during a site visit conducted in February 2016, there is evidence of breeding activity of interior least terns within 13 miles (21 km) of the Project Area (USFWS 2013b, 2015c).

Piping Plover

The piping plover (*Charadrius melodus*) is a federally and state threatened migratory shorebird that nests and forages along shorelines of small lakes, large beaches, river islands or industrial pond shorelines. Wide beaches with sparse vegetation are preferred nesting habitat, while wintering habitat includes ocean beaches (NatureServe 2016b). The piping plover Northern Great Plains Distinct Population Segment occupies sand and gravel bars and beaches along major rivers and around lakes, reservoirs, ponds, and alkali wetlands.

Critical Habitat is designated along the Missouri River/Oahe Reservoir in Hughes County (USFWS 2002); this is the closest critical habitat to the Project (within about 20 miles [33 km] to the west of the Project Area). Very little information is available about historical levels of breeding piping plovers prior to the 1980's. The 1988 Recovery Plan (USFWS 1988) documents historical breeding, which primarily occurs along the sandbars of the Missouri River. According to Aron (2005) the Oahe Reservoir supported approximately 19 percent of all Missouri River piping plovers from 1994 through 2004, although recent surveys of off-river sites have found few birds nesting in alkali lakes in central South Dakota (USFWS 2009). While this suggest that the state's alkali lake system could support addition breeding piping plovers, the Project Area is located outside of the major alkaline lakes nesting areas of plovers (USFWS 2009).

Inland nesting piping plovers are infrequently seen at suitable migration stopover points, indicating that they may fly non-stop to their Gulf of Mexico wintering areas (Johnson, Adolph, and Higgins 1997). Within South Dakota, reports of migratory piping plovers are not common, but the species does occur east and west of the Project Area (eBird 2019). Piping plovers are not known to breed within the Project Area, but they do breed in the vicinity of the Project Area along the Missouri River (Aron 2005).

State-Listed Species

Three species ranked by South Dakota as threatened or endangered are listed as occurring in Hyde County (SDGFP 2016), including one federally listed avian species (whooping crane), discussed in the federally listed species section above and one federally listed fish species (pallid sturgeon), discussed in Section 9.2.1.2.

The remaining species, the swift fox (*Vulpes velox*), is a state-threatened species that relies on open, rolling mixed-grass and short grass prairies with little or no shrubs. It also inhabits areas of mixed agricultural use, but population densities are lower in these areas. Prairie dog towns are a preferred habitat of swift fox, as they use burrows made by other mammals or dig their own burrows in sandy soils on high ground (NatureServe 2016c). Major threats to this species include loss of suitable native short and mixed-grass prairie due to conversion to agricultural and development. Herbaceous and agricultural areas within the Project Area, as well as prairie dog towns identified during surveys, might provide suitable habitat for the swift fox.

Bald and Golden Eagle Protection Act

Under authority of the Bald and Golden Eagle Protection Act (BGEPA; 16 USC 668-668d), bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are afforded additional legal protection. The BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase or barter, transport, export, or import, at any time or in any manner of any bald or golden eagle, alive or dead or any part, nest, or egg thereof (16 USC 668). The BGEPA also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" (16 USC 668c) and includes criminal and civil penalties for violating the statute. The term "disturb" is defined as agitating or bothering an eagle to a degree that causes or is likely to cause, injury to an eagle or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior (50 CFR 22.3).

The bald eagle occurs in South Dakota as a resident (BirdLife International and NatureServe 2014) utilizing suitable areas year-round, with verified and potential occurrences reported for Hyde County (eBird 2019, NatureServe 2016d). 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. Preferred perch sites include tall trees and snags located near nesting and foraging areas that provide good vantage points, while nests and foraging activities are usually associated with permanent water bodies (Buehler 2000, All About Birds 2016). There are multiple lakes and rivers within and/or adjacent to the Project that provide suitable nesting and wintering habitat for bald eagles. Furthermore, the Project is approximately 13.5 miles (21.7 km) northeast of the Missouri River, which serves as a migration corridor and provides suitable nesting and wintering habitat for bald eagles.

Observations of golden eagles have been reported in South Dakota during spring, summer, fall and winter (eBird 2019), with the majority of sightings in the vicinity of the Project reported during the winter season (National Audubon Society 2010). The golden eagle usually hunts on the rimrock terrain of open grassland areas and nests on cliffs near open foraging areas such as grassland or shrubland (Kochert, Steenhof, Mcintyre, and Craig 2002). During a site visit conducted by WEST on February 26, 2016, suitable foraging and roosting habitat was found within the 2016 Project Area and one golden eagle was observed perched in a tree within this same Project Area.

Birds of Conservation Concern

The USFWS lists 27 Birds of Conservation Concern (BCC) species within the Prairie Potholes Bird Conservation Region 11 (BCR 11; USFWS 2008). These species are protected under the MBTA, but they do not receive any greater protection than other migratory birds unless they are also listed by the USFWS under the ESA or the BGEPA. However, these species have been identified as vulnerable to population declines in the BCR by the USFWS (2008).

The potential exists for some of these species to breed within suitable habitats in the Project Area, including the American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), Swainson's hawk, upland sandpiper (*Bartramia longicauda*), marbled godwit (*Limosa fedoa*), black tern (*Chlidonias niger*), black-billed cuckoo (*Coccyzus erythropthalmus*), short-eared owl, red-headed woodpecker (*Melanerpes erythrocephalus*), Sprague's pipit (*Anthus spragueii*), grasshopper sparrow (*Ammodramus savannarum*), chestnut-collared longspur (*Calcarius ornatus*) and dickcissel (*Spiza americana*; Jennings et al. 2005). Although not recently recorded along nearby BBS routes, there is potential for breeding bald eagles near or within the Project area. The remaining BCC raptor, the peregrine falcon, is not likely to breed in the Project Area (Jennings et al. 2005).

Species of Greatest Conservation Need

In addition to the federally and state-listed species noted above, there are several species identified as Species of Greatest Conservation Need (SGCN) by the SDGFP's Wildlife Action Plan (SDGFP 2014) that have the potential to occur in the Project Area. Species were placed on this list by meeting one or more of the criteria including:

- State or federally listed species for which the state has a mandate for recovery
- Species that are regionally or globally imperiled and South Dakota represents an important portion of their remaining range or, the species is regionally or globally secure and for which South Dakota represent an important portion of their remaining range
- Species with characteristics that make them vulnerable, including species that are indicative of or depend on a unique or declining habitat in South Dakota, require large home ranges/use multiple habitats, depend on large habitat patch sizes, depend on an ecological process that no longer operates within the natural range of variation, are limited in their ability to recover on their own due to low dispersal ability or low reproductive rates, have a highly localized or restricted distribution (endemics) or concentrate their populations during some time of the year.

Only bird and bat SGCN are presented in Table 9-7, as these are the two groups most likely to be impacted by a wind facility. One bat SGCN, the NLEB, has the potential to occur in the Project Area (Table 9-7), while 20 bird SGCN have the potential to occur in the Project Area. While a SGCN designation does not afford these species with any regulatory protections, most of these avian species are also protected under the MBTA and the Bald and Golden Eagle Protection Act (BGEPA 1940).

Table 9-7. Birds and Bats Listed As South Dakota SGCN With the Potential to Occur in the Project Area

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Mammals					
Northern long-eared bat	*Myotis septentrionalis*		X		
Birds					
American white pelican	*Pelecanus erythrorhynchos*		X		
Baird's sparrow	*Ammodramus bairdii*	X		X	
Bald eagle	*Haliaeetus leucocephalus*	X	X	X	X
Black tern	*Chlidonias niger*		X		
Burrowing owl	*Athene cunicularia*		X		
Chestnut-collared longspur	*Calcarius ornatus*		X		
Ferruginous hawk	*Buteo regalis*	X	X	X	X
Golden eagle	*Aquila chrysaetos*	X	X	X	X
Greater prairie chicken	*Tympanuchus cupido*	X	X	X	X
Interior least tern	*Sternula antillarum athalassos*		X		
Lark bunting	*Calamospiza melanocorys*		X		
Leconte's sparrow	*Ammodramus leconteii*	X		X	
Marbled godwit	*Limosa fedoa*	X		X	
Northern goshawk	*Accipiter gentilis*				X
Osprey	*Pandion haliaetus*	X		X	
Piping plover	*Charadrius melodus*		X		
Sprague's pipit	*Anthus spragueii*	X	X	X	
Whooping crane	*Grus americana*	X		X	
Willet	*Catoptrophorus semipalmatus*		X		
Wilson's phalarope	*Phalaropus tricolor*		X		

South Dakota Natural Heritage Program

The South Dakota Natural Heritage Program maintains documentation of reported rare species. These include species that have a federal/state protection status (i.e., endangered, threatened, candidate, or proposed listing status) or state conservation status, which is a rarity ranking of breeding and non-breeding species (South Dakota Natural Heritage Program, 2018).

9.2.1.3 Studies Conducted to Date

Project-specific wildlife surveys began in April 2016 and are ongoing (Table 9-8). Throughout this time, the Project Area evolved through both expansions and contractions (Figure 11 in Appendix A). In order to incorporate areas previously outside of the Project Area, some surveys required multiple years to gather the required data over the specified area. Triple H consulted with the USFWS and SDGFP to identify which species and/or habitat surveys were needed and to provide input on the design the survey protocols (Appendix N). These wildlife surveys were conducted to satisfy the Tier 3 studies as recommended by the USFWS Land-Based WEG, Stage 2 of the ECPG and the USFWS and SDGFP guidance.

Table 9-8. Summary of Studies Conducted to Date at the Project Area

Survey Type	Dates	Survey Area Covered
Bird Surveys		
2016 Avian Use Studies	April 18–March 28	2016 Project Area
2016 Eagle Nest Surveys	March 28–April 1	2016 Project Area and 10-mile buffer
2016 Raptor Nest Surveys	March 28–April 1	2016 Project Area and 1-mile buffer
2016 Sharp-tailed Grouse and Greater Prairie Chicken Lek Surveys	March 29–April 30	2016 Project Area and 0.5-mile buffer
2018 Avian Use Studies	January 24, 2018–January 2019	2017 Project Area (excluding 2016 Project Area)
2018 Eagle Nest Surveys	March 9-14	2017 Project Area and 10-mile buffer
2018 Raptor Nest Surveys	March 9-14	2017 Project Area and 1-mile buffer
2018 Sharp-tailed Grouse and Greater Prairie Chicken Lek Surveys	March 27–May 6	2017 Project Area and 1-mile buffer (excluding 2016 Project Area)
Bat Surveys		
2016 General Bat Acoustic Survey	May 26–October 21	2016 Project Area (4 locations)
2018 General Bat Acoustic Survey	April 26–October 25	2017 Project Area (6 locations)
Threatened and Endangered Species Habitat Surveys		
Whooping Crane Stopover Habitat	Desktop	
Northern Long-eared Bat Habitat Assessment	Desktop	

Raptor and Eagle Nest Surveys

Nineteen raptor nests recorded during the 2016 and 2018 surveys are located within the current Project Area and 1-mile buffer. Eight of the nests are located within the current Project Area and 11 within 1-mile of the current Project Area (Figure 5 in Appendix C). Eight of the 19 nests were classified as occupied during the 2018 surveys, nine were inactive, and two nests identified during 2016 could not be relocated. Three nests were occupied by great-horned owls, four by red-tailed hawks, and one by a Swainson's hawk. No eagle nests are located within 10-miles of the current Project Area; however, the two previously referenced eagle nests documented during the 2018 surveys are located 13.7 and 15.6-miles southwest of the current Project Area.

Black-tailed Prairie Dog Towns

During aerial eagle and raptor nest surveys, black-tailed prairie dog (*Cynomys ludovicianus*) towns were opportunistically documented. In total, 11 towns were found, one of which is located within the Project Area (Figure 6 in Appendix C).

Prairie Grouse Lek Surveys

WEST conducted surveys to document prairie grouse leks during the 2016 and 2018 breeding seasons within the 2016 and 2017 Project Areas. The objective of the prairie grouse lek survey was to collect pre-construction data that can be used to help site the wind turbines to minimize impacts on prairie grouse. A combination of aerial and ground-based surveys was used to search for breeding prairie grouse locations in both 2016 and 2018. The 2016 surveys were conducted three times between March 29 and April 30. In 2018, surveys for new leks were conducted three times between March 27 and May 6 within the entire 2017 Project Area excluding areas that were previously surveyed within the 2016 Project Area. The surveys extended to a 1-mile buffer of the 2017 Project Area.

A total of 16 prairie grouse leks were located within a 2-mile (3.2 km) buffer of the current Project Area; 13 were classified as active and three as inactive during the 2018 breeding season (Table 3 in Appendix C). Six leks were located within the current Project Area, eight are located within the 1-mile buffer of the current Project Area and two were located between 1 and 2 miles of the current Project Area. Greater prairie-chickens were observed on 12 leks and sharp-tailed grouse were observed on the other lek. The three leks classified as inactive were observed in 2016 and no prairie grouse were noted during at least three checks during the 2018 breeding season.

The maximum number of birds on a greater prairie-chicken leks varied from 4 to19 birds with an average maximum count of 12 birds (Table 3 in Appendix C). The high count for the sharp-tailed grouse lek was six birds. It was often difficult to obtain an accurate count of males versus females during aerial surveys as most birds flushed when the plane approached the lek as well as from the ground due to the vegetation and distance from the county roads when attempting to get counts of the birds. Therefore, the maximum number of birds is reported and not maximum number of males; however, in several counts the maximum count represents the number of males observed displaying.

Northern Long-eared Bat Habitat Assessment

A desktop assessment of the presence of potentially suitable habitat for the NLEB was conducted within the Project Area. During the summer, suitable habitat for this species consists of forested areas where bats might roost, forage and commute between roosting and foraging sites. NLEB primarily forage or travel in forest habitat and are typically constrained to forest features (Boyles and Willis 2009). Therefore, habitat suitability was evaluated based primarily on the presence of forested areas that NLEB might use for roosting and foraging.

Forested patches were sorted by size into the following groups: <15 acre: small forest patches, 15-50 acres (6-20 hectares): potential NLEB roost/foraging habitat and >50 acres: large potential roost/foraging habitat. All polygons representing forested habitats were buffered by 500 feet (152 m) and dissolved to group any habitat patches within 1,000 feet of each other. This buffer, representing all forested habitats within 1,000 feet of each other, was then purged of small isolated patches by selecting only those connected habitats containing forested patches at least 15 acres in size. This selection of habitat patches was then buffered by 1,000 feet to represent the potential foraging area for NLEB (Figure 3a in Appendix A).

Two forested patches greater than 15 acres are located within current Project Area around the Chapelle Water Access Area (Figure 12 in Appendix C).

Whooping Crane Stopover Habitat Assessment

Triple H requested WEST implement a desktop review and analysis of potential whooping crane stop-over habitat within and adjacent to the Project Area. The habitat review and analysis evaluated whether or not the proposed current Project area represents unique whooping crane stop-over habitat compared to the surrounding landscapes.

Potential stop-over habitat for whooping cranes was evaluated using a model developed by The Watershed Institute, Inc. (TWI 2012). The TWI habitat assessment model is a quantitative and easily-replicated desktop approach to evaluating the quantity, quality, and locations of potential whooping crane stopover habitat in a given area. It is based on available data on water regime, water depth, visibility obstructions, wetland size, disturbance, and proximity to feeding areas, which are all factors that have been shown to affect how whooping cranes choose stopover habitat. The initial goal of the TWI model

was to provide electric utilities with a tool for making power line-marking decisions, but the USFWS stated in a personal communication (D. Mulhern, USFWS [retired], November 19, 2012) that it should be applicable to wind power development areas for the identification of potential whooping crane stop-over habitat as well. The desktop evaluation of potential whooping crane stopover habitat using the TWI model included the Project Area plus a 10 mi buffer.

Results of wetland feature scores calculated by TWI within the current Project and 10-mile buffer were compared to Quivira National Wildlife Refuge (Quivira), which is a traditional stop-over site for whooping cranes in Kansas. Based on the average score for Quivira wetlands, scores of 12 or higher were considered by TWI to be potentially suitable habitat.

High-scoring (12+) features were present within the current Project and 10-mile buffer area (Figure 11 in Appendix C). When comparing the TWI model results between the current Project area and the 10-mile buffer area, the areas are similar in that features scoring 12 were most common. The largest high-scoring features in terms of acreage and the areas with the most densely occurring high-scoring features were outside of the current Project Area to the north, southeast and west. The widespread availability of suitable stopover habitat indicates that if cranes are displaced from suitable habitat by development of the current Project, they are likely to find similar habitat nearby.

No whooping crane observations were confirmed through the fall of 2016 within the current Project Area and three observations were confirmed within 10 miles of that Project Area (Figure 11 in Appendix A; CWCTP 2016). The CWCTP emphasizes that the whooping crane observation data are incidental sightings and not accurate documentations of absence in areas where no observations are recorded, nor are observation locations representative of all sites used by tracked cranes since only the location of the first observation is logged in the database.

The USGS evaluated spatial intensity of use by 58 whooping cranes fitted with platform transmitting terminals (Pearse et al. 2015). Stopover sites used during spring and fall migration were tracked over five years. Based on stopover site use density and duration, 20-square-km grid cells were categorized as unoccupied, low use, core intensity or extended-use core intensity. The resulting data were meant as a tool to identify areas that may be important for migrating whooping cranes. Overlaying the USGS site use intensity data with the current Project Area indicates that the Project is located in an area with unoccupied and lower use intensity.

Acoustic Bat Survey

WEST conducted acoustic monitoring surveys to estimate levels of bat activity throughout the 2016 and 2017 Project Areas from May 26 to October 21, 2016 and April 26 to October 25, 2018 (Appendix C). Studies of bat activity followed the recommendations of the USFWS Land-based WEG (USFWS 2012) and Kunz et al. (2007).

In 2016 surveys, the AnaBat units recorded 1,663 bat passes during 291 detector-nights. All units recorded a combined mean (± standard error) of 5.64 ± 1.61 bat passes per detector-night. For all stations, 57.7 percent of bat passes were classified as high-frequency (HF; e.g., eastern red bats and *myotis* species), while 42.3 percent of bat passes were classified as low-frequency (LF; e.g., big brown bats, hoary bats, and silver-haired bats). Bat activity varied between seasons, with lower activity in the summer and higher activity in fall. At these stations, LF and HF bat pass rates peaked during the first part September. Higher activity during the late summer and early fall may be due to the presence of migrating bats passing through the area.

Avian Use Surveys

WEST conducted year-round avian use point count surveys in 2016 for the 2016 Project Area. 2018 point count surveys were conducted to document avian use for the portion of the expanded 2017 Project Area that was not part of the 2016 Project Area (Appendix E). 2016 points were surveyed for 60 minutes each, with all species of birds recorded during the first 20 minutes of the survey period and then only large birds recorded for the remaining 40 minutes. The initial 20-minute surveys allowed for comparison of small and large bird use, including diurnal raptor use, with the majority of wind projects in the region. The 60-minute surveys that encompassed large birds were consistent with the ECPG and were used to obtain a stronger dataset with which to evaluate large bird use and potential risk, particularly for eagles.

A total of 238 60-minute fixed-point surveys were completed and 59 unique bird species were identified. Five species composed 63.5 percent of all observations: red-winged blackbird (*Agelaius phoeniceus*), sandhill crane, snow goose (*Chen caerulescens*), horned lark (*Eremophila alpestris*) and Canada goose (*Branta Canadensis*). All other species accounted for less than 3 percent of the observations, individually. The most abundant large bird species observed were sandhill crane (3,970 individuals in 20 groups) and snow goose (3,875 individuals in six groups).

Diurnal raptor use was highest during the spring (0.34 birds/plot/60-minute survey) and lowest during the winter (0.09 birds/plot/60-minute survey) and mean annual use was 0.12 raptors/plot/20-minute survey. Six diurnal raptor species were identified with the most common being northern harrier (21 observations) and red-tailed hawk (17 observations). Diurnal raptor use was recorded at all but three of the 24 points. A total of four eagles (all bald eagles) were recorded during surveys, with an additional two bald eagles and four golden eagles observed incidentally during the survey.

A total of 15 sensitive species were observed within the 2016 Project Area during surveys or incidentally during the survey. No state and/or federally listed species were observed. Sensitive species recorded during the survey included 12 species designated as either a SGCN and/or BCC in the Prairie Potholes BCR 11 (USFWS 2008). Three sensitive species that are tracked by the South Dakota Natural Heritage Program and unlisted as BCC and SGCN, including Cooper's hawk, great blue heron, and merlin, were observed during surveys or incidentally within the Project Area.

9.2.2 Impacts to Wildlife

Within the wind industry, the primary concerns of wildlife-related impacts are generally associated with birds and bats. These impacts may be direct, such as those resulting from collision into MET towers or wind turbines during operations or habitat loss. Indirect impacts include displacement, habitat degradation or fragmentation. Permanent habitat loss due to construction of wind turbines will be minimal across the Project Area and localized. The sections below further describe potential impacts on birds, bats and other wildlife that have the potential to occur in the Project Area based on recent published research and project-specific survey results.

9.2.2.1 Federal and State-Status Terrestrial Species

This section discusses potential impacts to federally and state-listed species that have the potential to occur within the Project Area.

Northern Long-eared Bat

The Project Area is located on the western fringe of the NLEB range and within 150 miles (241.4 km) of a county with documented WNS and therefore must comply with the section of the NLEB 4(d) rule applying to areas impacted by WNS (USFWS 2016a). Triple H has completed a NLEB habitat assessment and avoided suitable habitat by 1,000 feet pursuant to USFWS guidance. Given the Project's location, the presence of limited suitable habitat and recorded occurrences of NLEB in the general vicinity of the Project, it is possible that this species occurs in the Project Area during migration and/or summer. However, incidental take of NLEB by wind turbines is exempted by the 4(d) rule.

Whooping Crane

Generally, risk regarding whooping cranes is considered low due to low population numbers and the little amount of time they spend flying during migration within the rotor swept heights. However, the Project Area provides potentially suitable habitat for whooping cranes as it is primarily composed of herbaceous cover and cropland with interspersed streams and areas of open water. Additionally, the Project Area is located within the 50 percent migration corridor. When comparing the TWI model results between an expanded version of the Project Area and the 10-mile buffer, the areas were found to be similar in that features scoring 11 or 12 were most common (Figure 11 in Appendix C). The lack of a concentration of high-scoring features within the Project Area relative to the surrounding landscape infers whooping cranes may not be more attracted to the Project Area and risky areas near wind turbine blades.

Red Knot

The rufa red knot is a potential but infrequent migrant through the Project Area during spring and fall. However, the potential of occurrence within the Project Area is considered unlikely given the lack of confirmed observations in the region (eBird 2019) and lack of suitable stopover habitat within the Project Area.

Interior Least Tern

Although no suitable nesting habitat was identified within the Project Area during the site visit conducted in February 2016, there is evidence of breeding activity of interior least terns within 13 miles (21 km) of the Project Area (USFWS 2013b, 2015c). Furthermore, least terns are documented migrants throughout Hyde County during the spring and fall and therefore have potential to occur in the Project Area.

Piping Plover

Although unlikely, the potential for occurrence of breeding piping plovers exists based on limited suitable habitat present during low water years on lands within and around the Project Area. Outside of the breeding period, this species may migrate over the Project Area.

Swift Fox

Based on a compilation of recent records and areas with established populations (Stratman 2015) and because the Project Area falls slightly (approximately 15 miles) outside of the species distribution (USGS 2016b), it is unlikely that this species will occur in the Project Area. However, if swift foxes were to be present in prairie dog colonies within or immediately adjacent to areas disturbed by Project development, direct and indirect impacts will be limited by the avoidance measures identified for burrowing owls that also use prairie dog towns.

Birds

Mortality or injury due to collisions with turbines or other infrastructure is the most probable direct impact to birds from wind energy facilities. Collisions may occur with resident birds foraging and flying within the Project or with migrant birds seasonally moving through the area. Project construction could affect birds through loss of habitat or fatalities from construction equipment. Impacts from decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance and equipment used. Potential mortality from construction equipment is expected to be relatively low, as equipment used in wind energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The highest risk of direct mortality to birds during construction is most likely the potential destruction of nests of ground- and shrub-nesting species during initial site clearing.

Post-construction fatality monitoring reports from the Midwest region of North America show a wide variation in levels of bird mortality, ranging from 0.27 to 8.25 birds/MW/year (Appendix E). This same wide variation in mortality was noted for studies specific to South Dakota wind farms, as bird mortality at the Wessington Springs facility ranged between 8.25 and 0.89 bird fatalities/MW/year in 2009 (Derby, Chodachek, Thorn, Bay and Nomani 2010) and 2010 (Derby, Dahl, Merrill, and Bay 2011), respectively. Other studies in South Dakota, as shown in WEST's 2016 Avian Use Report (Appendix E) report fatality rates between 1.41 and 5.06 birds/MW/year.

The majority of bird species commonly observed during the WEST avian surveys are not of conservation concern. Waterfowl, the most abundant group recorded, accounted for 48.1 percent of overall large bird observations; however, approximately 95 percent of all waterfowl observations were of snow goose and Canada goose. These two species were primarily observed in very large groups flying above the rotor swept area during spring. Similarly, the majority of sandhill cranes (about 75 percent), which composed 99.9 percent of waterbird observations recorded during the survey, were recorded flying above the rotor swept area, indicating these individuals were migrating over the Project Area rather than using habitats within the Project. Furthermore, sandhill cranes composed 96 percent of overall large bird use recorded during the fall. Despite their abundance, potential impacts to sandhill cranes are estimated to be low based on all available data regarding crane and wind energy facility interactions in North America; however, the risk of collision cannot be entirely ruled out.

Mean annual diurnal raptor use (0.12 raptors/plot/20-minute survey), which ranked 44th compared to 46 other studies of wind energy facilities where protocols similar to the present survey were implemented and had data for three or four different seasons. While overall risk to raptors is low, based on species composition of the most common raptor fatalities at other western wind energy facilities and species composition of raptors observed at the 2016 Project Area during the surveys, the majority of the fatalities of diurnal raptors will likely consist of red-tailed hawks. It is expected that risk to raptors will be unequal across seasons, with the lowest risk in the winter and highest risk during the spring. Raptor fatality rates are expected to be comparable to other wind energy facilities in South Dakota and the Midwest region.

9.2.2.2 Prairie Grouse

Human-induced influences that fragment grouse habitat could affect population growth rates, persistence or occupancy through negative behavioral responses affectively leading to habitat loss (Doherty, Copeland, Pocewicz and Kiesecker 2011). Currently, the state of the science related to wind power project effects on prairie grouse is developing; thus, management recommendations for future wind power projects are limited. The effects of wind energy development have been studied on three species of grouse

within the United States including the greater prairie-chicken, Columbian sharp-tailed grouse [*T. phasianellus columbianus*] and greater sage-grouse. Although the Project Area is outside of the range of the greater sage-grouse, due to the lack of peer-reviewed studies that investigate the effects of wind turbines on plains sharp-tailed grouse, the subspecies found within the Project Area, grouse studies in general were used to provide a framework for impact analysis.

Generally, these studies indicate grouse nest site selection, nest survival and female survival are not negatively affected by the presence of turbines (Winder et al. 2014a, McNew, Hunt, Gregory, Wisely and Sandercock 2014; Winder et al. 2014b; Proett 2017; LeBeau et al. 2017a; Harrison, Brown, Powell, Schacht, and Smith 2017). However, studies have indicated greater prairie-chicken space use during the breeding season in Kansas was negatively affected by proximity to turbines (Winder et al. 2014a) and lek abandonment was high for smaller leks within cropland habitats within 8 km of turbines (Winder, Gregory, McNew and Sandercock 2015). LeBeau (et al. 2017b) documented female greater sage-grouse habitat use during the breeding period decreased as proximity to turbines increased (LeBeau et al. 2017b) and Columbian sharp-tailed grouse had lower chick survival in habitats with increasing number of turbines (Proett 2017).

Given the location of leks within the Project Area and the likely presence of suitable nesting and brooding habitat in proximity to wind turbines or associated structures, the potential for either direct or indirect impacts exist. Siting turbines within agricultural fields and avoiding disturbance or fragmentation to large blocks of grassland habitats help reduce potential impacts to prairie grouse and their breeding habitat within the Project Area.

9.2.2.3 Eagles

Eagle observations occurred over the course of 237 hours of point count surveys. All bald and golden eagle observations occurred in the winter and spring, suggesting very little to no use of the Project Area by breeding eagles. This is supported by the results of eagle nest surveys conducted for the Project in 2016 which found no eagle nests within the Project Area or 10-mile buffer. However, 2018 surveys recorded two active nests approximately 13.7 and 15.6-miles southwest of the Project Area.

Eagle mortalities at wind energy facilities in the contiguous US (excluding the Altamont Pass Wind Resource Area in California) were summarized from public domain data by Pagel et al. (2013). Thirty-two wind energy facilities have experienced eagle fatalities (85 total fatalities—six bald eagles and 79 golden eagles [Pagel et al. 2013]). Three of the six bald eagle fatalities discussed by Pagel et al. (2013) were found in the Midwest (Iowa) and two were found in the Rocky Mountains (Wyoming). Two additional bald eagle fatalities have been found at wind energy facilities in Ontario (Allison 2012).

Given the low use of the site by bald and golden eagles and the relatively few bald eagle fatalities documented at wind energy facilities, impacts to eagles at the Project is estimated to be low; however, risk of collision cannot be entirely ruled out.

9.2.2.4 Bats

Bat fatalities have been discovered at most wind energy facilities monitored in North America, ranging from zero (Chatfield and Bay 2014) to 40.2 bat fatalities per MW per year (Hein, Prichard, Mabee and Schirmacher 2013). In 2012, an estimated 600,000 bats died as a result of interactions with wind turbines in the US (Hayes 2013). Proximate causes of bat fatalities are primarily due to collisions with moving

turbine blades (Grodsky and Drake 2011, Rollins, Meyerholz, Johnson, Capparella, and Loew 2012), but to a limited extent may also be caused by barotrauma (Baerwald 2008). The underlying reasons for why bats come near turbines are still largely unknown (Cryan and Barclay 2009). To date, post-construction monitoring studies of wind energy facilities show that a) migratory tree-roosting species (e.g., eastern red bat, hoary and silver-haired bat) compose approximately 78 percent of reported bat fatalities; b) the majority of fatalities occur during the fall migration season (August and September); and c) most fatalities occur on nights with relatively low wind speeds (e.g., less than 6.0 m/s [19.7 foot per second]; Arnett et al. 2008, 2013; Arnett and Baerwald 2013).

Approximately 42.3 percent of bat passes recorded in the Project Area were emitted by LF bats (Appendix F). These LF species may become casualties because they typically fly at higher altitudes (Aldridge and Rautenbach 1987, Norberg and Rayner 1987, Fenton, and Bogdanowicz 2002). Given that hoary bats, eastern red bats, and silver-haired bats are among the most commonly found bat fatalities at many facilities (Arnett et al. 2008, Arnett and Baerwald 2013), it is expected that these three species will likely be the most common fatalities at the Project.

Mean bat activity during the fall migration period at the fixed ground detectors (9.08 ± 3.23 bat passes per detector-night; Table 4 in Appendix F) was about average for the majority of studies available from the Midwest (Appendix F). Based on available studies in the Midwest, observed bat activity rates may be indicative of fatality rates ranging from 0.16 to 30.61 bats/MW/year and the Project is expected to have a low to moderate fatality rate. Overall bat activity was highest within the Project during the fall migration period, peaking in early September. This timing is consistent with peak fatality periods for most wind energy facilities in the US and suggests that bat fatalities at the Project will be highest during late summer to early fall and will likely consist largely of migrating individuals.

Given that over two-thirds of bat fatality studies in the Midwest report fewer than five bat fatalities/MW/year (Appendix F), it is possible that similar fatality rates might be recorded at the Project. However, some studies indicate that facilities in agricultural settings in the Midwest can produce higher levels of bat fatalities (Jain 2005, Baerwald 2008, Gruver, Sonnenberg, Bay and Erickson 2009).

9.2.3 Mitigation Measures for Wildlife

The Triple H Wind Project has been sited to avoid or minimize impacts to federally and state- protected species. Pending completion of pre-construction avian and bat studies, Triple H will prepare a Bird and Bat Conservation Strategy (BBCS) that will be implemented during construction and operation of the Project. The BBCS will consist of Triple H's corporate standards for minimizing impacts to avian and bat species during construction and operation of wind energy projects and will be developed in a manner that is consistent with the USFWS Land- Based WEG (USFWS 2012). It will include Triple H's commitments to wind project siting, construction practices and design standards, operational practices, permit compliance and construction and operation worker training.

In addition, Triple H has implemented or will implement the following mitigation measures to avoid or minimize potential impacts to wildlife in the Project Area during Project design, construction, operation, and decommissioning.

9.2.3.1 Design

- Maximize infrastructure siting in previously-disturbed habitat to avoid habitats associated with protected wildlife and plant species, localized areas of concentrated bird and bat use and breeding/brood-rearing areas;
- Minimize siting turbines in native prairie and native plant communities. Previously disturbed lands, including existing roads, will be used, where practical, to minimize wildlife habitat fragmentation;
- All turbines will be sited away from SDGFP South Dakota Game Production Areas and USFWS Waterfowl Production Areas (WPA); to reduce risk to waterfowl and waterbirds and grassland-associated birds;
- Prairie dog town will be avoided to the extent possible to minimize disturbance to potential swift fox, burrowing owl, and other species (i.e. raptors);
- Avoid or minimize disturbance of wetlands during Project construction. A wetland delineation will be conducted prior to construction to identify the limits of wetland boundaries in the vicinity of Project activities;
- Turbine towers will be designed and constructed to discourage bird nesting and wildlife attraction; no perching structures will be placed on the nacelles of the turbines;
- Guy wires will not be used on permanent MET towers;
- Wind turbines will be illuminated as required by FAA regulations;
- Lighting guidelines will be followed where applicable, from the USFWS Land-Based WEG (USFWS 2012). This includes using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination and avoidance of steady-burning, high- intensity lights. Hoods/shields will be installed on exterior lights at the O&M facility, collector switchyard and interconnection substation to minimize skyward light. All unnecessary lighting will be turned off at night to limit attraction of migratory birds;
- If site evaluations show that proposed construction activities will pose a significant risk to avian or bat species of concern, establish buffer zones around known raptor nests, bat roosts and biota and habitats of concern;
- Turbines will be sited more than 305 m (1,000 feet) from the edge of connected patches of forested habitat to avoid potential impacts to bats, including NLEBs, during the summer;
- Construct wind turbines using tubular monopole towers;
- Turbine doors will not have exterior lights installed at the entrance;
- Consult with the appropriate natural resource agencies to avoid scheduling construction activities during important periods for wildlife courtship, breeding and nesting that are applicable to sensitive species within the Project Area; and
- Minimize the size of areas in which soil will be disturbed or vegetation will be removed.

9.2.3.2 Construction

- Reduce habitat disturbance by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas; traffic will be restricted to Project-specific roads and use of unimproved roads will be restricted to emergency situations;
- Speed limits will be set to ensure safe and efficient traffic flow; signs will be placed along roads, as necessary, to identify speed limits, travel restrictions and other standard traffic control information;
- Educate and instruct employees, contractors and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons;
- Prior to construction, all supervisory construction personnel will be instructed on the BBCS and wildlife resource protection measures, including: (1) applicable federal and state laws (e.g., those that prohibit animal collection or removal) and (2) the importance of these resources and the purpose and necessity of protecting them and ensure this information is disseminated to applicable contractor personnel, including the correct reporting procedures;
- Sound water and soil conservation practices will be maintained during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. The includes the preparation and implementation of a SWPPP. The SWPPP will include standard sediment and erosion control devices and practices (e.g., silt fences, straw bales, netting, mulching. temporary seeding, soil stabilizers, check dams, grassed waterways,) to minimize soil erosion during and after construction;
- Stormwater management practices will be implemented to minimize open water resources that may attract birds and bats;
- Triple H will initiate habitat restoration of disturbed soils and vegetation as soon as possible after construction activities are completed. Restore areas of disturbed soil using weed-free native grasses, forbs and shrubs, in consultation with land managers and appropriate agencies; and
- Noxious weeds will be controlled in all surficially disturbed areas using mowing and/or herbicides.

9.2.3.3 Operation

- Conduct post-construction mortality monitoring for a minimum of one year. The survey will include searcher efficiency and carcass removal trials and the overall mortality rate will be adjusted based on the trial results. This protocol is based on guidelines from the USFWS Land-Based WEG (USFWS 2012) and the National Wind Coordinating Collaborative Comprehensive Guide to Studying Wind Energy/Wildlife Interactions (Strickland et al. 2011). Estimates of mortality will follow either the Schoenfeld or Huso method as appropriate per Strickland et al. (2011);
- Turn off unnecessary lighting at night to limit attraction of migratory birds. Follow lighting guidelines, where applicable, from the USFWS Land-Based WEG (USFWS 2012). This includes

using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination and avoidance of steady-burning, high- intensity lights;

- Instruct employees, contractors and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. Pets will not be allowed in the Project Area;
- With the exception of bird and bat carcasses, all carrion discovered on site during regular maintenance activities will be disposed of in an appropriate manner to prevent the attraction of eagles and other raptors. All discoveries of bird and bat carcasses will follow protocol as described in the BBCS; and
- Triple H will encourage landowners to appropriately and regularly dispose of livestock carcasses to prevent the attraction of eagles and other raptors to the Project Area;

9.2.3.4 Decommissioning

- Triple H will remove all turbines and ancillary structures from the Project Area;
- Triple H will salvage and reapply topsoil excavated during decommissioning activities to disturbed areas during final restoration activities;
- Triple H will reclaim areas of disturbed soil using weed-free native shrubs, grasses and forbs. Restore the vegetation cover, composition and diversity to values commensurate with the ecological setting.

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

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

10.1 Existing Aquatic Ecosystem

10.1.1 Surface Water and Wetland Resources

The Project Area is located within the Medicine Knoll and Fort Randall Reservoir HUC 8 watersheds of the Fort Randall Reservoir HUC-6 watershed. Aside from Chapelle Lake, no other significant, open water communities are present within the Project Area. Instead, aquatic resources are dominated by wetlands, which cover approximately 1,234 acres (4.5 percent) of the Project according to NWI data. Based on the data, wetlands found in the Project Area consist of four vegetation classes, including those from the Palustrine (inland wetlands), Riverine (rivers) and Lacustrine (lake) Systems. Streams within the Project Area are primarily intermittent watercourses; some of which have been bermed to create ponds. Given the pervasiveness of wetlands within the Prairie Pothole region, aquatic biota with the Project Area is likely representative of the region.

Chapelle Lake, located in the southwest portion of the Project Area, is approximately 40 acres in size. According the SDGFP (2018a), Chapelle Lake is a managed fishery for northern pike (*Esox lucius*) and yellow perch (*Perca flacescens*), while black bullhead (*Ameiurus melas*) and white sucker (*Catostomus commersonii*) are also commonly present. Given the lake's small size, deepwater habitat is likely limited.

10.1.2 Federal and State Special Status Aquatic Species

Pallid Sturgeon

The pallid sturgeon (*Scaphirhynchus albus*) is a federally and state endangered fish species adapted to sandy areas with fine substrates, floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters within large river ecosystems (USFWS 2014). Major threats to this species are habitat alteration caused by channelization and dam construction, leading to the replacement of estuarine and flooded areas by permanent lakes and alteration of water flow and temperature. Although potential/verified occurrence of the pallid sturgeon has been reported for all counties that are contiguous with the Missouri River, its geographic range falls outside the Project Area (USFWS 2013c). The pallid sturgeon can be found in the Missouri River, approximately 13.5 miles (21.7 km) southwest of the Project.

10.2 Impacts to Aquatic Ecosystems

10.2.1 Surface Water and Wetland Resources

Temporary and long-term operational impacts to surface waters and wetlands are discussed in Sections 8.2.1.1 and 8.2.1.2. Construction activities in the vicinity of these waterbodies and wetlands may temporarily increase sedimentation due to erosion and from changes in runoff patterns and water volumes due to increased impervious surfaces. This could temporarily degrade the water quality of aquatic habitat supporting these species. Triple H will avoid development in proximity to Chapelle Lake. Impacts are anticipated to be short term and localized.

10.2.2 Federal and State Special Status Aquatic Species

Pallid Sturgeon

The pallid sturgeon can be found in the Missouri River, approximately 13.5 miles (21.7 km) southwest of the Project. No suitable habitat is present within the Project Area and therefore the pallid sturgeon will not be affected by the development and operation of the Project.

10.3 Mitigation Measures for Aquatic Ecosystems

As described in Section 8.2.3, for surface water and wetlands, BMPs will be designed and utilized to control sedimentation and erosion during the construction phase of the Project. The pallid sturgeon is not present within the Project Area. Therefore, no mitigation measures are proposed.

11.0 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.

11.1 Land Use and Ownership

11.1.1 Existing Land Use and Ownership

The Project Area is predominantly located on private land (Figure 11 in Appendix A). Occupied farm sites and rural residences occur within the Project Area and other scattered rural residences are adjacent to, but outside of, the Project Area. Occupied farmsteads and rural residence locations were originally identified using satellite imagery and verified with field surveys conducted in the fall of 2018 There are 13 occupied dwellings in the Project Area, which, as defined in Section 11.3.2 are noise sensitive receptors.

As discussed in Section 9.1.1 and Table 9-1, land use within the Project Area is predominantly agricultural, consisting of a mix of cropland, grassland pasture and grass hay land. Other digitized land cover within the Project Area include NWI wetlands, developed areas, trees and water (Table 9-1). The of NWI wetlands are included in Table 8-2. Developed lands included roads, ranches and residential areas, feed lots and stock yards. Trees typically included shelterbelts with a mixture of evergreen and deciduous species, near residences or along field borders. Figure 12 in Appendix A provides Project land use based on the classification system specified in ARSD 20:10:22:18(1).

The USDA NRCS and Farm Service Agency (FSA) administer a number of conservation-based programs for private landowners. The CRP conserves soil and water resources and provides wildlife habitat by removing enrolled tracts from agricultural production, generally for a period of 10 years. An offspring of the CRP program is the Conservation Reserve Enhancement Program with similar management constraints and goals. These tracts cannot be hayed, tilled, seeded, or otherwise disturbed (including

disturbance associated with power line or other project construction) without authorization from the USDA. The FSA does not distribute the location of CRP lands without written authorization from landowners, however as of the time of this report, 4,913 acres of land in Hyde County are enrolled in the program (FSA 2017).

Another NRCS conservation program is the Wetland Reserve Program (WRP), a voluntary program to restore and protect wetlands on private property. The NRCS provides technical and financial support to help landowners with wetland restoration efforts. The program allows landowners to choose permanent conservation easements, 30-year easements or 10-year restoration cost-share agreements (NRCS 2018). No construction is permitted on WRP land. There are no WRP wetlands identified in the Project Area.

Other NRCS programs include the following:

- The Farm and Ranch Land Protection helps purchase development rights to keep productive farm and ranchland in productive use.
- The Grasslands Reserve protects, restores and enhances grassland including rangeland, pastureland, shrublands and certain other lands.
- The Healthy Forests Reserve Program assists landowners in restoring, enhancing and protecting forestland resources or private lands.

Desktop analysis confirmed that there was no land enrolled in these NRCS programs within the Project Area (NCED 2018).

Croplands included fields where corn (*Zea mays*), soybeans (*Glycine max*), sunflowers (*Helianthus annuus*), sorghum (*Sorghum bicolor*), alfalfa (*Medicago sativa*), winter wheat (T*riticum aestivum*) or other row crops were grown. Herbaceous grassland vegetation was divided into grassland pastures or grass hay. Grassland pastures typically were characterized by a mixture of native cool and warm season grasses including western wheatgrass (*Pascopyrum smithii*), green needle grass (*Nassella viridula*), needle-and-thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*) and little blue stem (*Schizachyrium scoparium*). Grass hay fields typically contained fewer species such as smooth brome grass (*Bromus inermis*) and intermediate wheatgrass (*Thinopyrum intermedium*) and could possibly have been older CRP fields that were hayed in 2017. The SDSU 2013 study quantifying undisturbed grasslands of eastern South Dakota identified approximately 8,156.0 acres of potentially undisturbed grassland present within the Project Area (approximately 29.9 percent of the Project Area). Comparing potentially undisturbed grassland present within the Project Area with the WEST land cover map, the Potentially Undisturbed Lands were primarily digitized as grassland pastures. Based on the 2012 Census of Agriculture in South Dakota, both the number and land in farms in Hyde County increased by 14 percent and 7 percent respectively from 2007 to 2012 (USDA 2012). Corn for grain, wheat for grain, forage-land (hay, grass silage, greenchop), soybeans for beans and sunflower seed are the top crops grown in Hyde County by acreage. Pasture land in Clark County supports cattle and other livestock operations; cattle and calves are the top livestock raised in the county by number (USDA 2012).

There are no irrigated lands (center-pivot), major industries or areas zoned for residential or commercial land uses in the Project Area.

11.1.2 Land Use Impacts

The Project will result in conversion of a small portion of the land within the Project Area from existing agricultural land uses into a renewable energy resource during the life of the Project. It is estimated that approximately 583 acres of land will be temporarily impacted by Project construction. Approximately 82 acres of land will have long-term operational impacts (0.3 percent of the total land within the Project Area; Table 9-3). Temporary impacts associated with construction staging and laydown areas and underground collector lines will also occur. Following construction, the areas will be returned to pre-construction land uses, which primarily consist of croplands and grassland pasture.

There are 13 occupied dwellings within the Project Area. As designed, the Project layout of turbines, access roads, collector lines and associated facilities will not cause displacement of residences or businesses due to construction of the Project. As currently designed, the closest participating residence to a turbine is approximately 1,500 feet; the closest non-participating residence to a turbine is approximately 3,000 feet. As discussed in Section 19.0, the facility will be decommissioned at the end of the Project's operating life. Disturbed surfaces will be graded, reseeded and restored to their pre-construction conditions, unless otherwise agreed to by the landowner.

11.1.3 Mitigation Measures for Land Use

During construction, the construction workspace located on cropland and grasslands will be removed from productivity; however, following construction these areas will be restored and returned to its prior use. Fencing or grazing deferment in pasture lands within or adjacent to the construction workspace may also be necessary to prevent livestock from injury by entering the construction area. Triple H will work with landowners on the following issues: installation of gates and cattle guards where access roads cross existing fence lines, access control, signing of open range areas, traffic management (e.g., vehicle speed management) and location of livestock water sources. Additionally, the following BMPs will be used:

- Excess concrete will not be buried or left in active agricultural areas.
- Vehicles will be washed outside of active agricultural areas to minimize the possibility of the spread of noxious weeds.
- Topsoil will be stripped from any agricultural area used for traffic or vehicle parking, segregated, and replaced during restoration activities.
- Drainage problems caused by construction will be corrected to prevent damage to agricultural fields.
- Following completion of construction and during decommissioning, subsoil will be decompacted.

11.2 Recreation, Public Facilities and Conservation Easements

11.2.1 Existing Recreation, Public Facilities and Conservation Easements

The Project Area is predominantly located on private land. Of the 27,247.5 acres in the Project Area, only 1,273 acres (approximately 5 percent) are publicly owned. These include one 138-acre GPA and three parcels of South Dakota School and Public Lands. These are described in more detail in Section 11.2.1.3. While there are several USFWS conservation easements in the Project Area, these are private lands (see Section 11.2.1.4).

11.2.1.1 Recreational Resources

Recreational opportunities in Hyde County include hunting, biking, hiking, boating, fishing, camping, swimming, horseback riding, cross country skiing, snowmobiling and nature viewing. The Woodruff Lake State Game Area is approximately 6.5 miles southwest of the Project Area in Hughes County. The Lake Louise State Recreation Area is approximately 17.5 miles northeast of the Project Area. As discussed in Section 11.2, Chapelle Lake and the Holabird Managed Fish Areas are public fisheries located within or adjacent to the Project Area (Figure 9 in Appendix A; SDGFP 2018a).

11.2.1.2 Public Facilities

No schools, churches or cemeteries occur within the Project Area, although several schools, churches and cemeteries are located just outside the Project Area in the city of Highmore (Figure 9 in Appendix A).

11.2.1.3 South Dakota Office of School and Public Lands

The South Dakota Office of School and Public Lands manages over 750,000 acres of land in the state (SDGFP 2018c). These lands are available to the public for hunting and fishing. There are three parcels of School and Public Lands located throughout the Project Area

11.2.1.4 SDGFP Lands

GPAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. The SDGFP owns and manages the Chapelle GPA located within the Project Area and the Highmore GPA, located approximately 1 mile north of the Project Area (Figure 9 in Appendix A; SDGFP 2018b).

SDGFP contracts with private landowners to provide general hunting access through the Walk in Area (WIA) program. The WIA program leases private land with valuable hunting areas for unlimited public hunting access (foot-traffic only) in exchange for an annual payment and immunity from non-negligent liability (SDGFP 2018c). There are no WIAs within the Project Area; however, one WIA directly abuts the northern border of the Project Area, at Township 112N, Range 72W, Section 19 (SDGFP 2018c).

Figure 9 (Appendix A) shows the locations of GPAs, WIAs hunting areas and School and Public Lands in the Project vicinity, which are all public lands open for hunting.

11.2.1.5 USFWS Lands

The Project is located within the USFWS Huron Wetland Management District (WMD). The Huron WMD consists of 59 WPAs, totaling 17,683 fee-owned acres in Beadle, Sanborn, Jerauld, Hand, Hyde, Hughes, Sully and Buffalo counties (USFWS 2018c). These areas are part of the National Wildlife Refuge System and are managed for the production of waterfowl, but other game and nongame wildlife thrive on them as well. USFWS WPAs are managed to protect breeding, forage, shelter and migratory habitat for waterfowl or wading birds, such as ducks, geese, herons, and egrets. WPAs provide opportunities for viewing wildlife and intact ecosystems and also provide hunting opportunities. There are no WPA's located within the Project Area; however, the Hyde County WPA is located immediately south of the Project Area, south of 204th street (Figure 9 in Appendix A).

The Huron WMD also works with private landowners to administer the wetland easement and grassland easement programs. A grassland easement is a legal agreement that pays landowners to keep their land in grass. Land covered by a USFWS grassland easement may not be cultivated and mowing, haying and grass seed harvesting must be delayed until after July 15 each year. This restriction is to help grassland nesting species, such as ducks and pheasants, complete their nesting before the grass is disturbed. Grazing is not restricted. Similarly, the wetland easement program pays landowners to permanently protect wetland basins. Protected basins covered by a wetland easement cannot be drained, filled, leveled, or burned. When these protected basins dry up naturally, they can be farmed, grazed, or hayed. A USFWS wetland easement protects the protected basin within a parcel; however, the upland area outside the protected basin is not covered by the easement. The wetland easements help provide crucial habitat for many types of wildlife including ducks, pheasants, and deer. Hunting and trapping are allowed on both grassland and wetland easements and the easements do not affect landowners' mineral rights. (USFWS 2010a and b).

As shown in Figure 9 (Appendix A), the Project Area encompasses:

- 4 acres of grassland easements;
- 965 acres of top lease grasslands; and
- 1,782 acres of protected wetland basins.

Section 21.2.1 summarizes ongoing coordination between Triple H and the USFWS regarding conservation easements and Project facilities. Triple H is avoiding all non-top lease grassland conservation easements and will avoid the protected basins associated on the wetland easements. Over a series of emails and calls, Triple H and the USFWS discussed the grassland easement that was "top leased" by the USFWS after Triple H had existing wind easements in place that had been executed with landowners and recorded in the appropriate land records prior to the USFWS implementation of a grassland easement for all or a portion of the property. The phrase "top leased" is refers to the circumstance in which a lease is executed covering land upon which a current lease already exists. In this instance, Triple H easements were in place prior to the USFWS grassland easements. The South Dakota state law principle of "first in time - first in rights" applies here. As a result, the Project easements are superior to the USFWS grassland easements in the identified "top leased" areas. The USFWS reviewed the grassland easement and concurred that the existing wind easements and their associated lease agreements supersede any USFWS easements that were established after the fact and determined that no authorization from the USFWS will be required as it relates to the wind easement. Based on discussions with USFWS (Appendix N), the agency understands and agrees that the Triple H easements will take precedent because they were in-place before the USFWS grassland easements. As a result, NEPA will not be triggered due to Triple H placing the four turbines and associated roads and collector lines on the "top-leased" lands.

11.2.2 Impacts to Recreation, Public Facilities and Conservation Easements

11.2.2.1 Recreational Resources

Lake access to Chapelle Lake will not be restricted as a result of Project construction or operation. The closest turbine and its associated construction workspaces are approximately 0.5 mile from Chapelle Lake.

11.2.2.2 Public Facilities

The Project will not impact public facilities in the area.

11.2.2.3 South Dakota Office of School and Public Land Areas

There are 3 turbines and associated access roads and collector lines proposed on the School and Public Lands parcels located within the Project Area. If Triple H constructs turbines within the School and Public Lands parcels, access to these parcels will be temporarily restricted within active construction areas; however, no long-term impacts to use are expected.

11.2.2.4 SDGFP Lands

The Project avoids direct impacts to all GPAs and WIAs.

Operation of the wind energy facility could disrupt movements of terrestrial wildlife, particularly during migration. Herd animals, such as white-tailed deer could be affected if linear rows of turbines intersect migration paths between winter and summer ranges or in calving areas (National Wind Coordinating Committee 2002). However, based on the abundance of suitable habitat in the Project Area and non-linear nature of the wind turbine layout, impacts to white-tailed deer are anticipated to be negligible. Therefore, impacts to the availability or distribution of deer for hunting in the Project Area is anticipated to be negligible. See Section 9.2 for a discussion on the potential impacts of the Project on waterfowl and other bird species that are hunted in the Project Area.

11.2.2.5 USFWS Lands

The Project has been designed to avoid impacts to USFWS grassland easements and the delineated features associated with the USFWS wetland easement program. Four turbines and associated access roads and collector lines are located on easements that were "top leased" with USFWS grassland easements (Figure 9 in Appendix A). The Project will result in long-term operational impacts to approximately 3.4 acres and temporarily impact approximately 27.4 acres on "top leased" grassland easements described in Section 11.2.1.5. The Project will result in long-term operational impacts to approximately 0.4 percent of the top lease grassland easements where Triple H had procured wind easements prior to the USFWS securing the grassland easement.

11.2.3 Mitigation Measures for Recreation, Public Facilities and Conservation Easements

11.2.3.1 Recreational Resources

The Project will not impact recreational resources in the area; therefore, no mitigation is required.

11.2.3.2 Public Lands

The Project will not impact public facilities in the area; therefore, no mitigation is required.

11.2.3.3 South Dakota Office of School and Public Land Areas

Triple H will ensure that adequate safety measures are established for recreational visitors to School and Public Lands during construction and operation. These may include access control and traffic management. Triple H will work with SDGFP to address safety issues associated with the School and Public Lands.

11.2.3.4 SDGFP Lands

The Project avoids GPAs and WIAs, so no mitigation is required.

11.2.3.5 USFWS Lands

Triple H coordinated with the USFWS regarding the exact boundaries of the USFWS wetland, grassland, and conservation easements (Figure 9 in Appendix A). Triple H's layout reflected in this Application balances setbacks, constructability, noise, shadow flicker, cultural resources, sensitive habitat, and other factors.

Following construction, disturbed areas will be returned to pre-construction land uses. In addition, impacts on USFWS easements will be reduced using BMPs to minimize the delivery of sediment due to erosional processes. BMPs for sediment and erosion control will be implemented within wetland conservation easements to minimize impacts to protected basins on wetland easements.

11.3 Acoustics

A Pre-Construction Wind Turbine Acoustic Assessment was conducted for the Project in December 2018 and is included in Appendix G. The results of the acoustic assessment show that the Project will comply with the Hyde County 45-A-weighted decibel (dBA) limit at all receptors, except for three participating landowner properties which may periodically experience sound levels above the noise threshold criteria. The following is information on the existing sound levels within the Project Area, the potential effects of the Project's construction and operation and potential avoidance, minimization, and mitigation measures.

11.3.1 Existing Acoustic Levels and Regulatory Framework

County and township (section line) roads characterize the existing roadway system and the Project Area is accessible via U.S. Highway 14, State Highway 47, and other local two-lane paved and gravel county roads. The land within the Project Area is primarily agricultural with scattered farmstead residences. Current land use within the Project Area is primarily agricultural, supporting both crops and livestock grazing. Potential noise-sensitive receptor (NSR) locations within the Project Area and in the vicinity of proposed turbine locations were included in the acoustic analysis (Figure 11 in Appendix A).

Ambient acoustic environment refers to the all-encompassing sound in a given environment or community. Hyde County will generally be considered a rural agricultural area. Existing ambient sound levels are expected to be relatively low, although sound levels will be higher near roadways such as U.S. Highway 14 and State Highway 47. Other human activity such as agricultural operations will seasonally contribute to sound levels in the area associated with crop harvests. Background sound levels are expected to vary both spatially and temporally depending on natural sounds and proximity to area sound sources such as roadways. Typically, background sound levels are quieter during the night than during the

daytime, except during periods when evening and nighttime insect noise may contribute to the soundscape, predominantly in the warmer seasons.

11.3.1.1 Acoustical Terminology

Airborne sound is described as the rapid fluctuation or oscillation of air pressure above and below atmospheric pressure, creating a sound wave. Sound is characterized by properties of the sound waves, which are frequency, wavelength, period, amplitude, and velocity. Noise is defined as unwanted sound. A sound source is defined by a sound power level, which is independent of any external factors. The acoustic sound power is the rate at which acoustical energy is radiated outward and is expressed in units of watts. Sound energy travels in the form of a wave, a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure. A sound pressure level is a measure of this fluctuation and can be directly determined with a microphone or calculated from information about the source sound power level and the surrounding environment through predictive acoustic modeling. While the sound power of a source is strictly a function of the total amount of acoustic energy being radiated by the source, the sound pressure levels produced by a source are a function of the distance from the source and the effective radiating area or physical size of the source. In general, the magnitude of a source's sound power level is always considerably higher than the observed sound pressure level near a source since the acoustic energy is being radiated in various directions.

Sound levels are presented on a logarithmic scale to account for the large pressure response range of the human ear and are expressed in units of decibels (dB). A dB is defined as the ratio between a measured value and a reference value usually corresponding to the lower threshold of human hearing defined as 20 micropascals. Conversely, sound power is commonly referenced to 1 picowatt, which is one trillionth of a watt. Broadband sound includes sound energy summed across the frequency spectrum. In addition to broadband sound pressure levels, analysis of the various frequency components of the sound spectrum is often completed to determine tonal characteristics. The unit of frequency is Hertz (Hz), which corresponds to the rate in cycles per second that sound pressure waves are generated. Typically, a sound frequency analysis examines 11 octave bands (or 33 1/3 octave) ranging from 20 Hz (low) to 20,000 Hz (high). This range encompasses the entire human audible frequency range. Since the human ear does not perceive every frequency with equal loudness, spectrally varying sounds are often adjusted with a weighting filter. The A-weighted filter is applied to compensate for the frequency response of the human auditory system. Sound exposure in acoustic assessments is commonly measured and calculated as A-weighted decibels (dBA). Unweighted sound levels are referred to as linear. Linear dB are used to determine a sound's tonality and to engineer solutions to reduce or control noise as techniques are different for low and high frequency noise.

Sound can be measured, modeled, and presented in various formats, with the most common metric being the equivalent sound level (abbreviated as Leq). The equivalent sound level has been shown to provide both an effective and uniform method for comparing time-varying sound levels and is widely used in acoustic assessments in South Dakota. Estimates of noise sources and outdoor acoustic environments and the comparison of relative loudness are presented in Table 1 (Appendix G).

11.3.1.2 Regulations

A review was conducted of noise regulations applicable to the Project at the federal, state, county, and local levels. There are no federal or state environmental noise requirements specific to this Project. Hyde

County proposed regulations for wind energy facilities under Zoning Ordinance Section 9-104-A-18 limiting sounds levels to 45 dBA at the perimeter of occupied residences existing at the time the permit application unless a signed waiver is obtained from the landowner or the land is leased. The noise level may be exceeded during short-term events such as utility outages or wind storms.

Sound levels resulting from the Project at all identified receptors located in the vicinity of the Project were assessed against the 45 dBA limit to determine whether compliance was achieved. The Hyde County Zoning Ordinance noise limit is absolute and independent of the existing acoustic environment; therefore, a baseline sound survey was not required to assess conformity.

11.3.2 Impacts from Acoustics

11.3.2.1 Construction and Decommissioning

Potential noise associated with construction and decommissioning of the Project includes site clearing, grading, foundation work and wind turbine generator installation. All reasonable efforts will be made to minimize the impact of noise resulting from construction activities. Sounds generated by construction activities are typically exempt from state and local noise oversight if they occur within weekday, daytime periods. While most heavy construction work is anticipated to occur during daylight hours, some construction operations may be conducted outside of normal working hours. In these cases, the necessary construction efforts generally require activities that must be completed in their entirety once initiated (i.e., pouring concrete). All construction and decommissioning related noise producing activities will be undertaken as to comply with applicable state and county regulatory obligations and ordinances. The list of construction equipment that may be used on the Project and estimates of near and far sound source levels are presented in Table 11-1.

Table 11-1. Estimated Maximum Sound Pressure Levels from Construction Equipment

Equipment	Estimated Sound Pressure Level at 50 feet (dBA)	Estimated Sound Pressure Level at 2000 feet (dBA)
Crane	85	53
Forklift	80	48
Backhoe	80	48
Grader	85	53
Man basket	85	53
Dozer	83–88	51–56
Loader	83–88	51–56
Scissor Lift	85	53
Truck	84	52
Welder	73	41
Compressor	80	48
Concrete Pump	77	45
Concrete Batch Plant	83	51

Source: FHWA 2006; Bolt et al. 1977

11.3.2.2 Operation

When in motion, the wind turbines generate sound primarily from aerodynamic flow across and around the blades. Secondary contributors to turbine noise are associated with the mechanical and electrical equipment within the nacelle including gearboxes, motors, cooling systems and pumps. Sound level is

strongly dependent on the speed of the tip of the blade, the design of the blade and on atmospheric conditions such as the degree of turbulence. Blade noise increases with wind speed until full rated electrical power is achieved due to the interaction between the incident turbulence eddies and the blade surface. The prevalence of this inflow turbulence noise will vary depending on site-specific and variable atmospheric conditions. The second mechanism is the shedding of vortices that form at the tip of each blade. This depends on the strength of the vortex and the design of the blade tip. Finally, noise may be generated by turbulent flow over the trailing edge of the blade. As air flows over the face of the blade, a turbulent boundary layer develops, but remains attached to the trailing edge. Eddies extending past the trailing edge causes sound emission scattering, resulting in the characteristic wind turbine broadband swooshing sound. This turbulent boundary layer noise (trailing edge noise) usually defines the upper limit of wind turbine noise levels and is considered the greatest contributor to aerodynamic noise.

One of the primary blade design features affecting noise emissions is the shape of the trailing edge of the blades. The turbine model analyzed on this Project, the GE 2.72-116, is equipped with Low-Noise Trailing Edges (LNTE) blade technology as an optional noise mitigative feature to reduce audible noise. The addition of blade serrations has been demonstrated to reduce noise levels by 2 to 3 dBA below standard blades.

11.3.2.3 Acoustical Model Inputs

Sound propagation modeling was conducted using the CadnaA (Computer-Aided Noise Abatement) program (version 2018 MR1), a comprehensive 3-dimensional acoustic modeling computer simulation software, with calculations made in accordance with the International Organization for Standardization (ISO) Standard 9613-2 "Attenuation of Sound during Propagation Outdoors." The engineering methods specified in this standard consist of full (1/1) octave band algorithms that incorporate geometric spreading due to wave divergence, reflection from surfaces, atmospheric absorption, screening by topography and obstacles, ground effects, source directivity, heights of both sources and receptors, seasonal foliage effects and meteorological conditions. For compliance assessment purposes, operational broadband sound pressure levels were calculated assuming that all wind turbines are operating continuously and concurrently at the maximum manufacturer-rated sound level. The assessment was performed using the November 16, 2018, proposed layout with 103 potential wind turbine locations (noise sources) to calculate the noise levels at the 117 NSRs.

11.3.2.4 Acoustical Modeling Results

Acoustic modeling was completed for wind turbine operation for the following conditions thereby describing the full range of expected receive sound levels at receiver locations: (1) initial cut-in wind speeds; (2) maximum rotation; and (3) maximum rotation during anomalous meteorological conditions.

The maximum calculated noise level, based on assumptions incorporated into the CadnaA model and the turbine layout, results in a 49 dBA L_{EQ} at one NSR and under anomalous meteorological conditions, three NSRs have the potential to breach the 45 dBA noise limit threshold as mandated under the Hyde County Zoning Ordinance (Table 5 in Appendix G). As all three NSRs involve landowners participating in the project, no written waiver is required. When turbines are at maximum rotational power, acoustics models suggest two NSRs breach the 45 dBA noise limit, while all NSR's are modeled to remain below the 45dBA limit at cut-in speeds.

11.3.3 Mitigation Measures for Acoustics

Project operational sound has been calculated and compared to the 45 dBA Hyde County Zoning Ordinance noise requirements. Acoustic modeling analyses per ISO Standard 9613-2 and inclusive of a number of conservative assumptions demonstrate the Project will operate in compliance with the 45 dBA noise limit at all NSRs, except at three participating landowner properties which may periodically experience sound levels above the criteria threshold. "Modeling shows that any landowners experiencing noise levels above the limits will experience them only in very limited circumstances. Even then, those landowners are Project participants and have agreed to these terms after having the circumstances explained to them Therefore, Triple H does not anticipate that noise mitigation will be necessary. However, Triple H will establish a process for documenting, investigating, and resolving Project-related noise complaints. With respect to the short-term construction-related noise, mitigation measures will include maintaining all equipment in good working order in accordance with manufacturer specifications (e.g., suitable mufflers and/or air-inlet silencers should be installed on all internal combustion engines and certain compressor components); and enforcing speed limits for all vehicles and construction equipment traveling within and around the Project Area.

11.4 Visual Resources

11.4.1 Existing Visual Resources

The term "visual resources" refers to the composite of basic terrain features, geologic features, hydrologic features, vegetation patterns and anthropogenic features that influence the visual appeal of an area.

Private lands crossed by Project are not subject to known federally, state or county visual management standards. Sensitive viewsheds are generally associated with scenic resources and can include state or national parks, monuments and recreation areas or historic sites and landmarks. Recreational users in the Project Area and vicinity may include hunters accessing GPAs, WPAs, WIAs and School and Public Lands and recreationists accessing Chapelle Lake. There are 13 occupied residences within the Project Area and other scattered rural residences adjacent to, but outside, the Project Area. Travelers through the Project vicinity include local or regional traffic along U.S. Highway 14, State Highway 47, or other local roads. There are no designated scenic byways in the Project Area (Federal Highway Administration 2018).

The South Dakota Wind Energy Center is located approximately 3 miles southeast of the Project Area (Figure 1 in Appendix A). This NextEra Energy Resources wind farm consists of 27 turbines and became operational in 2003. Additionally, the Titan Wind Project, consisting of 10 turbines and is located approximately 13.8 miles east of the Project Area (Figure 1 in Appendix A). This project became operational in December 2009.

11.4.2 Impacts to Visual Resources

Visual impacts can be defined as the human response to visual contrasts resulting from introduction of elements into a viewshed. Such visual contrasts interact with viewer perceptions of the landscape and may cause a negative, positive, or neutral response to the changes in the viewed landscape.

The Project would add additional vertical lines of wind turbines into the generally strongly horizontal landscape found in the Project Area. Based on the turbine model selected, the total hub height of the turbines would be approximately 295 feet, the total turbine height from the ground to the tip of the blade

in an upright position of approximately 487 feet. These structures could produce visual contrast by virtue of the design attributes of form, color, and line. Marker lighting could also cause visual impacts at night.

Nearby viewers include the rural residences dispersed throughout the Project Area; recreational and public land users; and drivers, primarily those using U.S. Highway 14, State Highway 47, and other local roads. For these nearby viewers, the large size, and strong geometric lines of both the individual turbines themselves and the array of turbines could dominate views. The presence of the wind farms within the viewsheds of GPAs, WPAs, WIAs and School and Public Lands and Chapelle Lake may diminish the natural quality of those areas and the experience of the persons utilizing those areas and may be perceived as a negative impact. However, the operation of the Project will not generate a significant increase in traffic or noticeable increase in day-to-day human activity; therefore, the Project Area will retain the rural sense and remote characteristic of the vicinity. Furthermore, the proposed land use will not involve any ongoing industrial use of non-renewable resources or emissions into the environment.

Although the turbines are high-tech in appearance, they are compatible with the rural, agricultural heritage of the area. The large sweep of the moving rotors would tend to command visual attention. Structural details, such as surface textures, could become apparent, and associated structures such as the O&M building, Project collection substation, interconnection switching station, approximately 500-foot long transmission line and other structures could also be visible. Shadow flicker, a subset of visual impacts is discussed in Section 11.5 of this Application.

As previously discussed, Triple H has collocated linear Project features such as access roads and collector and communication systems with existing disturbances where possible. This is consistent with the South Dakota Bat Working Group's and SDGFP's (Undated) Siting Guidelines for Wind Power Projects in South Dakota for reducing impacts to visual resources. Similarly, operation of the Project will not introduce new visual components into the Project vicinity. The Project vicinity includes wind turbines from the South Dakota Wind Energy Center and the Titan Wind Project, as well as existing electrical transmission lines.

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

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

To minimize visual impacts of the Project, Triple H has incorporated setback requirements and commitments into the design of the Project (Table 12-1). In accordance with FAA regulations, the towers will be painted to reduce potential glare and minimize visual impact. The cumulative effect of the Project and existing projects may be perceived as increasing the "industrial" appearance of the wind farms in the Project Area and the areas from which they will be seen.

At the end of the Project's operating life, the facility will be decommissioned (see Section 19.0) and all wind turbines, electrical cabling, electrical components, roads, and any other associated facilities will be removed in accordance with applicable state and county regulations, unless otherwise agreed to by the landowner. As such, no visual impacts will remain beyond the operating life of the Project.

11.4.3 Mitigation Measures for Visual Resources

Triple H does not anticipate adverse impacts to visual resources and therefore no mitigation measures over those already described are proposed.

11.5 Shadow Flicker

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

11.5.1 Shadow Flicker Overview

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker and can be a temporary phenomenon experienced at nearby residences or public gathering places. The impact area depends on the time of year and day (which determine the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width and orientation of the rotor blades). Shadow flicker impact to surrounding properties generally occurs during low angle sunlight conditions, typically during sunrise and sunset times of the day. However, when the sun angle gets very low (less than three degrees), sunlight passes through more atmosphere and becomes too diffused to form a coherent shadow. Shadow flicker will not occur when the sun is obscured by clouds or fog, at night or when the source turbine(s) are not operating. In addition, shadow flicker only occurs when at least 20 percent of the sun's disc is covered by the turbine blades.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 2,000 m (6,562 feet) is very low and generally considered imperceptible. In general, increasing proximity to turbines may make shadow flicker more noticeable, with the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurring nearest the wind turbines.

Shadow flicker impacts are not regulated in applicable state or federal law. However, the Hyde County Zoning Ordinance Section 9-104-A-20 establishes that flicker at any receptor shall not exceed 30 hours per year within an established dwelling and 40 hours per year from any occupied structure.

11.5.2 Shadow Flicker Impacts

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPro software package. As described above, the Project will install up to 92 wind turbines; however, 103 potential turbine locations were evaluated. The WindPro analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors surrounding the Project turbines.

A total of 117 residential structures were identified within and near the Project Area as occupied or potentially occupied residences and are considered potential shadow-flicker receptors. A receptor in the model is defined as a 1-meter-square area (approximate size of a typical window), 1 m (3.28 feet) above ground level. Approximate eye level is set at 1.5 m (4.94 feet). Figure 1 (Appendix H) shows the

locations of all 117 identified residential structures, along with the 103 potential turbine locations considered.

Table 11-2 summarizes the shadow flicker impact prediction statistics. The predicted shadow flicker impact for all 117 receptors is included in Appendix H. The maximum predicted shadow flicker impact at any occupied residence receptor is 24 hours and 57 minutes per year (Receptor 81). This is approximately 0.56 percent of the potential available daylight hours. All of the receptor locations had modeled shadow flicker impacts below Hyde County's ordinance threshold of 30 hours per year.

Table 11-2. Statistical Summary of WindPro Expected Shadow Flicker Impacts—Number of Modeled Receptors

Cumulative Shadow Flicker Time (Expected)	Number of Modeled Receptors
Total	117
= 0 Hours	104
>0 Hours < 10 Hours	7
≥10 Hours < 20 Hours	3
≥20 Hours < 30 Hours	3
≥ 30 Hours	0

At a distance of 2,640 feet or greater for non-participants and 1,540 feet or greater for participants (the Project setbacks for residences), receptors will typically experience shadow flicker only when the sun is low in the sky and only when the factors described above are present. If a receptor does experience shadow flicker, it most likely will be only during a few days per year from a given turbine and for a total of only a fraction (typically less than 1 percent) of annual daylight hours.

11.5.3 Mitigation Measures for Shadow Flicker

Triple H has considered shadow flicker when siting wind turbines to minimize impacts to area residents. Flicker mitigation will be addressed as situations arise wherein a residence is experiencing inordinately more flicker than anticipated in the modeling, although it is highly unlikely more flicker than modeled will occur. If shadow flicker concerns are reported to Triple H, Project representatives will implement the following procedure:

- Log the contact in Triple H's complaint database to track resolution efforts;
- Prepare site-specific assessment of shadow flicker impacts, noting the time of day, season and expected duration of future flicker impacts;
- Meet with the landowner to discuss site-specific assessment, educate landowners on landowner driven mitigation strategies (e.g., modification of interior lighting) and discuss concerns;
- Assess the residence to determine if on-site mitigation measures, including but not limited to, installation of exterior or interior screening, are appropriate for the level of impact and effectively address the concern;
- Work with the landowner to develop a mitigation plan; and
- Implement the mitigation plan.

11.6 Telecommunications

11.6.1 Existing Telecommunications

Triple H has conducted a microwave beam path analysis, which identified two paths intersecting the Project Area (Figure 4 in Appendix I). The analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed, and applied paths from 0.9 - 23 GHz1. Table 11-3 lists all microwave paths that intersect the Project Area.

Table 11-3. Summary of Microwave Paths that Intersect the Project Area

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Licensed	WBD224	WBD225	6.7 GHz	77.00	Basin Electric Power Cooperative
2	Licensed	WBD225	WQRB909	6.1 GHz	59.49	Basin Electric Power Cooperative

Source: Comsearch 2016

Comsearch provided the Fresnel Zones within the area of interest. These zones show the narrow area of signal swath and should be avoided, if possible. A depiction of the individual Fresnel Zones is shown in Figure 4 (Appendix I).

Triple H submitted a Project notification letter to the National Telecommunications and Information Administration (NTIA) on April 18, 2016, for the agency to review potential impacts to federally telecommunications. A copy of the letter and NTIA's response is available in Appendix M and discussed further in Section 22.2.

11.6.2 Telecommunication Impacts

Because of their height, modern wind turbines have the potential to interfere with existing communications systems licensed to operate in the US. Based on Comsearch's analysis, turbines have been sited in a manner that avoids all identified microwave beam paths and communication systems (Figure 4 in Appendix I). The construction and operation of the Project will not result in interference to microwave, radio, or navigation signals.

The NTIA provided comments on June 17, 2016. After a 45+ day period of review, the NTIA received responses from the USDA, Department of Commerce, Department of Justice, and Department of Navy stating, "no harmful interference anticipated" (Appendix M).

11.6.3 Mitigation Measures for Telecommunications

The Project has been sited to avoid microwave beam paths and therefore, no mitigation is proposed. In the event the Project wind turbines or its operation causes interference to communication systems, Triple H will take the steps necessary to correct the problem. If interference is identified during or after construction of the Project, Triple H will address the interference on a case-by- case basis.

11.7 Radar and Military Airspace Impacts

11.7.1 Existing Radar and Military Airspace

Triple H conducted an aviation constraints study to evaluate the feasibility of the Project against federally aviation and airspace criteria (Appendix J). The FAA uses this criteria in evaluating the aeronautical compatibility and regulatory compliance of projects when submitted to their office for regulatory review under FAR Part 77 as specified in Title 49 UCS 447.8. The study determined the feasibility of the wind turbines up to 499 feet above ground level.

The nearest public-use airport subject to federal regulatory criteria is the Highmore Municipal Airport located approximately 4.1 miles north of the Project Area (Figure 1 in Appendix A). One other airport, Miller Municipal, was located approximately 23 miles east of the Project Area near the City of Miller.

11.7.2 Impacts to Radar and Military Airspace

In addition to providing vertical above mean sea level limits within the Project Area, the aviation constraints analysis included the following findings:

- The Project will not impact Minimum Vectoring Altitudes or Enroute Low Altitude Airways;
- Impact is likely to Joint Use Long Range Radar. Further study may be advised. For additional follow-up with DoD see Section 22.2.4;
- No impact is expected to NEXRAD weather radar. Further weather radar study is not necessary; and
- The Project is outside any Military Operations Areas or Restricted Areas.

11.7.3 Mitigation Measures for Radar and Military Airspace

Triple H filed with the FAA on October 12, 2018, via Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) and received a Determination of No Hazard (DONH) from the FAA for a preliminary array for turbine location up to 535 feet. FAA Form 7460 filings have been submitted for the current array at a height of 499 feet and are under review. Given that the current filing is in the same general area of the prior filing and utilizing shorter turbines, it is anticipated that DONHs will be issued by the FAA.

If taller turbines are used or if the Project layout changes from what has been previously provided to the FAA, Triple H will re-file with the FAA.

12.0 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 will be constructed in Hyde County on agricultural land. Per the Hyde County Zoning Ordinance, a wind energy facility located in the Agricultural Zoning District must obtain a Conditional Use Permit (CUP). Triple H submitted an application for a CUP on November 29, 2018 for the wind turbines under Section 9-104 of the ordinance and will comply with all terms and conditions of the permit. The County Commission hearing on the CUP application is scheduled for February 5, 2019. Triple H's current configuration has been designed to comply with county setbacks and other applicable requirements, as outlined in Table 12-1 below and displayed on Figure 2 in Appendix A.

Section 9-104 of the Hyde County Zoning Ordinance, the Requirements for Siting LWES, outlines a number of general provisions including but not limited to: mitigation measures, setbacks, electromagnetic interference, lighting, turbine spacing, feeder lines, towers, noise, etc. Triple H will comply with all provisions and setback requirements. Table 12-1 outlines the local, state and voluntary Project setbacks.

Table 12-1. Wind Turbine Setback Requirements for the Project

Turbine Setback Requirement	Requirements	Proposed Setbacks
Hyde County		
9-104.A.9 (a) Any established dwellings and/or maintained by governmental entity	2,640 feet or 4.9 times tower height, whichever is greater	1,540 feet for participating dwellings. Triple H is in the process of obtaining waivers from all landowners where setbacks are not met.
9-104.A.9 (b) County gravel roads, section line roads, highways and minimum maintenance roads	750 feet or 1.4 times the tower height, whichever is greater	775 feet plus any distance needed to meet noise requirement and shadow flicker commitment.
9-104.A.9 (c) Exterior boundary of the proposed wind project	500 feet or 1.1 times the system height, whichever is greater	535 feet minimum from unsigned landowners which constitutes the outermost edge of the Project.
Noise requirement at the perimeter of occupied residences	Distance from receptors must meet the noise standard of 45 dBA	Triple H will site turbines at the distance required to meet the standard of 45 dBA.
South Dakota		
SDCL 43-13-24 Property lines	500 feet or 1.1 times the height of the tower, whichever is greater	256 feet from participating land owners and 535 feet from nonparticipating landowners. Triple H is in the process of obtaining waivers from all landowners where setbacks are not met.

Table 12-1. Wind Turbine Setback Requirements for the Project

Turbine Setback Requirement	Requirements	Proposed Setbacks
Local		
9-104.A.20 Shadow Flicker	Flicker at any receptor shall not exceed 30 hours per year within an established dwelling and 40 hours per year from any occupied structure	Distance required to meet commitment of 30 hours per year or less at any residence.

13.0 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 8.0. As discussed in Section 8.2.2, the excavation and exposure of soils during the construction and decommissioning of wind turbines, access roads, underground collector lines and other Project facilities may temporarily cause sediment runoff during rain events. This sediment may temporarily increase the total suspended solids loading in receiving waters. However, erosion control BMPs will keep sediments on site that might otherwise increase sediment loading in receiving waters.

As discussed in Sections 8.1.3 and 8.2.3, construction of the Project will 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 will be developed during civil engineering design of the Project and will prescribe BMPs to control erosion and sedimentation. The BMPs may include silt fence, wattles, erosion control blankets, temporary stormwater sedimentation ponds, revegetation and/or other features and methods designed to control stormwater runoff and mitigate erosion and sedimentation. The BMPs will be implemented to reduce the potential for impacts to drainage ways and streams by sediment runoff. Because erosion and sediment control will be in place for construction, operation and decommissioning of the Project, impacts to water quality are not expected to be significant.

Section 9-104.A.8 of the Hyde County Zoning Ordinance requires LWES to develop a Soil Erosion and Sediment Control Plan prior to construction and submit the plan to the County Zoning Office. The Ordinance outlines several components required in the plan including but not limited to: plans for revegetation, grading, minimizing area of disturbance, maintaining downstream quality, etc. Triple H will submit a copy of the SWPPP to the County Zoning Office.

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14.0 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.*

14.1.1 Existing Air Quality

The entire State of South Dakota is in attainment for all National Ambient Air Quality Standards (NAAQS) criteria pollutants (EPA 2018). In accordance with USEPA requirements, the SDDENR operates an ambient air monitoring network of samplers. The nearest air monitoring location to the Project is located approximately 30 miles to the southwest in Pierre, Hughes County (SDDENR 2018g). The primary emission sources that exist within the Project Area include agriculture-related equipment and vehicles traveling along State Highway 47.

14.1.2 Air Quality Impacts

Temporary construction impacts include fugitive dust emissions and short-term emissions from diesel trucks and construction equipment. Temporary impacts will result if a batch plant is required. Any air quality effects resulting from construction will be short term and limited to the time of construction activities and will not result in NAAQS exceedances for particulate matter or significantly contribute to greenhouse gas emissions.

There will be no direct air emissions from operating wind turbines, because no fossil fuels will be combusted. Wind power is a low-carbon energy source, when a wind turbine generates electricity it produces zero carbon emissions. The development of clean wind energy avoids significant carbon dioxide (CO_2) pollution. In 2017, the electricity generated from wind turbines avoided an estimated 189 million tons of carbon pollution. This reduction is equal to roughly 11 percent of 2017 power sector emissions, or 40.3 million cars' worth of CO_2 emissions. Wind power also helps cut significant amounts of sulfur dioxide (SO_2) and nitrogen oxides (NOx), air pollutants known for creating smog and triggering asthma attacks. According to the EPA's AVERT tool, in 2017 alone, electricity generated from wind turbines displaced about 188,000 tons of sulfur dioxide (SO_2) and over 122,000 tons of nitrogen oxides (NO_X) (AWEA 2018b).

Negligible amounts of dust, vehicle exhaust emissions and combustion-related emissions from diesel emergency generators will occur during maintenance activities. These emissions will not cause exceedances of air quality standards or have any negative impacts on climate change. Operation of the Project and interconnection substations could produce minute amounts of ozone and nitrogen oxides emissions as a result of atmospheric interactions with the energized conductors. Impacts on ambient air quality from these minor emissions during operation will be negligible. The collection switching station and Project interconnection substation, will employ sulfur hexafluoride-filled circuit breakers. Sulfur hexafluoride is a greenhouse gas and therefore, equipment leaks could contribute to air quality impacts.

14.1.3 Mitigation Measures for Air Quality

A general air quality permit may be required if the Project elects to install a concrete batch plant. Approval of that application typically takes up to 30 days. If a batch plant is required, it will be permitted by Triple H's balance-of-plant contractor or concrete batch plant operator through the SDDENR.

Additionally, BMPs will be implemented during construction to suppress fugitive dust emissions and equipment will undergo routine inspection and preventative maintenance to minimize leaks.

General mitigation measures applicable to multiple phases of project development include the following:

- Using surface access roads, on-site roads, and parking lots with aggregates or that maintain compacted soil conditions to reduce dust generation;
- Staging construction activities to limit the area of disturbed soils exposed at any particular time; and
- Watering unpaved roads, disturbed areas (e.g., scraping, excavation, backfilling, grading and compacting) and loose materials generated during Project activities as necessary to minimize fugitive dust generation.

15.0 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 Project is scheduled to be operational by late fall of 2020. To remain on track, Hyde County CUP and SDPUC facility permits are anticipated to be received in 2019, while pre-construction engineering, layout finalization and construction will begin in the spring, summer and fall 2019 (Table 15-1). However, the possibility for delays as result of conditions beyond the Applicant's control exist. Land-leasing and environmental permitting are ongoing.

Table 15-1. Preliminary Permitting and Construction Schedule for the Project

Milestone	Date
Land Leasing	2015–present
Environmental Studies	2016–present
County CUP	2018–2019
SDPUC facility permit	2019
Pre-construction Engineering	Spring–Summer 2019
Construction	Summer/Fall 2019
Commercial operation date	Late Fall 2020

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16.0 COMMUNITY IMPACT (ARSD 20:10:22:23 and ARSD 20:10:22:24)

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.

16.1 Socioeconomic and Community Resources

16.1.1 Existing Socioeconomic and Community Resources

The Project Area is located in northeastern South Dakota in Hyde County. Hyde County had an estimated population of 1,420 in 2010 (U.S. Census Bureau 2010). The largest city in Hyde County is the City of Highmore which, in 2010, had an estimated population of 795 (56 percent of Hyde County; Data-USA 2018; U.S. Census Bureau 2010). Highmore is located approximately 2.9 miles northeast of the Project Area. There are two additional communities located within 15 miles of the Project Area; the populations of communities in the Project vicinity are listed in Table 16-1 and shown on Figure 1 (Appendix A).

Table 16-1. Populations of Communities in the Project Vicinity

Community, County	2010 Population	Distance and Direction from Project Area
Highmore, Hyde County	795	2.9 miles northeast
Harrold, Hughes County	124	5.1 miles northwest
Ree Heights, Hand County	62	11.4 miles northeast

Source: U.S. Census Bureau 2010

The median household income in Hyde County reported in the 2010 census data was $41,196 (U.S. Census Bureau 2010). In comparison to the state as a whole, the median household income for the state was slightly higher ($48,168; U.S. Census Bureau 2010). The unemployment rate in Hyde County in October 2018 was 3.0 percent, which was higher than the unemployment rate in South Dakota for the same month (2.6 percent) (South Dakota Department of Labor and Regulation 2017).

From 2015 to 2016, employment in Hyde County grew at a rate of 1.18 percent, from 762 employees to 771 employees (Data -USA 2018). The most common job groups are Management, Business, Science, & Arts, Natural Resources, Construction, & Maintenance and Service. The most common employment sectors are Agriculture, Forestry, Fishing, Hunting, Educational Services and Healthcare & Social Assistance (Data-USA 2018).

16.1.2 Socioeconomic and Community Resource Impacts

16.1.2.1 Impacts to Economics

The Project is anticipated to provide positive short-term and long-term impacts to the local economy. Impacts to social and economic resources from construction activities will be short-term. Increased patronage of local commercial businesses, such as restaurants, grocery stores, hotels and gas stations, will result in increased business from construction related workers. Local contractors and suppliers will also likely benefit from construction of the Project. Total wages and salaries paid to contractors and workers in Hyde County will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county and state by circulation and recirculation of dollars paid out by Triple H for business expenditures and for state and local taxes. Expenditures made for equipment, fuel, operating supplies and other products and services benefit businesses in the county and the state.

During construction, a typical 250 MW wind project such as Triple H typically generates an immediate need for up to 200 temporary construction jobs over the peak 8-month construction period. Construction and operation of a typical 250 MW wind project results in the injection of millions of dollars into the local economy both immediately and throughout the life of the project. These investments will be seen throughout the community, including at hotels, restaurants, gas stations, auto repair companies, tire companies, grocery stores and countless other local businesses. During operation, the O&M facility will employ approximately 15 to 20 full-time personnel as facility managers, site managers and turbine technicians. A breakdown of the typical construction and operation jobs for a 250 MW wind energy project are shown below in Section 17, Table 17-1.

Long-term beneficial impacts to the state and local tax base as a result of the operation of the Project will contribute to improving the local economy in this area of South Dakota. In addition to the creation of jobs and personal income, the Project will pay capacity and production taxes which will benefit the state, Hyde County, school districts and the communities in the Project Area with wind turbines. Direct Project economic impacts over 25 years of operation (based on 250 MW project):

- Landowners Payments: Approximately $1.5 million per year;
- Property Tax Payments: Approximately $1.3 million per year *Tax allocation details provided below.
- Full-Time Jobs: Approximately 15 to 20 full time jobs totaling up to approximately $1.5 million per year.

The yearly tax projection is based on the Wind Farm Production and Capacity tax defined in SDCL Ch. 10-35 (16-21). The estimates are based on Triple H operating 250.24 MW's of nameplate capacity and an operations profile designed by Triple H's experienced development team. The actual amount paid will be based on current law and real operations of the year in question. Allocations to taxing jurisdictions are projected below with conservative production measures.

The total projected annual capacity and generation tax is projected to be around $1.2 million per year totaling approximately $30 million over 25 years distributed as follows:

- State of South Dakota: Approximately $600,000 per year totaling $15 million over 25 years
- Hyde County: Approximately $209,510 per year totaling $5.23 million over 25 years
- Townships (no townships, county benefit): Approximately $89,790 per year totaling $2.24 million over 25 years
- School Districts: Approximately $299,300 per year totaling $7.48 million over 25 years
  - Part of the total School Districts amount above will be additional revenue for local school district (years 1-9 only): Amounts vary per year totaling $1.55 million in additional tax revenue over the first 9 years.
  - Part of the total School Districts amount above will be local revenue projected to offset state funding needs (years 6-20+): Amount varies per year totaling $4.70 million over years 6-10+. Following 10 years all revenue is considered local effort.
  - Note: SDCL Ch. 13-13 specifies how the school district's portion of tax revenue is allocated over time. In summary, 100 percent is retained by the school district to which the tax revenue is allocated; however, after the first five years of operation, how the tax revenue allocation is treated in the school funding formula changes. As a result, the amount of tax revenue outside of the state funding formula decreases by 20 percent per year until the entire tax revenue allocation is included in the funding formula to offset the need for state aid.

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

16.1.2.2 Impacts to Property Values

No negative impacts to property values are anticipated from the Project. A review of academic literature pertaining to wind project development and its impact on property values was completed for a similar project in Clark County, South Dakota (Crocker Wind Farm, LLC; Docket No. EL17-055). The report summarized the results of two Hedonic Price Model studies (Hoen, Wiser, Cappers, Thayer and Sethi 2009; Hoen et.al. 2013) conducted by the Environmental Energy Technologies Division of the Lawrence Berkeley National Laboratory (LBNL) and included a review of additional studies providing supportive and critical views (Thayer 2017). The 2009 LBNL study determined that there was no significant impact to sale values of properties over time due to proximity of wind-energy project development. The 2013 follow-up study examined changes in property values of 51,276 home sales from 27 counties in nine states within 10 miles of 67 individual wind energy projects. This study found no statistical evidence for differences in home values from pre- to post-construction.

The 2009 and 2013 LBNL studies evaluated wind farms in a variety of landscapes, including agricultural areas. The studies examined 36 unique counties in the United States. It noted that 21 of the 36 unique counties are considered more than 50 percent rural, whereas only four counties (Benton, WA; Walla Walla, WA; DeKalb, IL; Atlantic, NJ) are less than 22 percent rural (City Data 2017). Sixteen unique counties have a percentage rural greater than or equal to 59 percent, the raw average of the South Dakota counties. According to the U.S. Census Bureau's 2010 Census, Hyde County is 100 percent rural (U.S.

Census Bureau 2010). Additionally, Hyde County's land cover is 25.8 percent pasture grassland and several counties that were examined have land cover dominated by pasture land (over 50 percent) including Grady, OK; Custer, OK; Kittitas, WA; and Howard, TX (USDA 2012).

Because none of the previous academic research or literature on the impact of large-scale wind farms on nearby property values has included South Dakota wind projects, to predict what might occur near South Dakota wind facilities requires the transfer of existing research from similar areas. The LBNL studies were constructed with transferability specifically in mind as they used a wide range of community types so that the results will be applicable to the maximum number of alternative sites.

The range of counties studied in the LBNL studies include counties like those in South Dakota. Hyde County is similar to some of the LBNL counties, which implies that the LBNL studies are a reasonable transfer source. In general, the South Dakota counties have lower average population per square mile, median income and median home values than the average county in either the 2009 or 2013 LBNL studies. The South Dakota counties are very similar to their Minnesota and Iowa counterparts, especially Cottonwood and Jackson counties, Minnesota and Franklin and Sac counties, Iowa.

Table 16-2 provides a more detailed examination among the three South Dakota counties and Cottonwood and Jackson counties, Minnesota and Franklin and Sac counties, Iowa. Two additional measures of similarity are presented—mean size of farms and the percent of the workforce employed in agriculture, broadly defined. In addition, the calculated averages are weighted by population. As is evident, the percent employed in agriculture is very close between the comparison group and the South Dakota counties. Mean farm size is larger in the South Dakota counties but the percent rural is larger in the comparison group. This group-wise comparison suggests that the LBNL studies do include information from counties similar to those evaluated in South Dakota.

Given the information about the types of facilities planned and the previous research on like counties, the LBNL studies are a reasonable source for a benefit transfer (or damage transfer) effort to South Dakota. This leads to the overall conclusion that this Project in Hyde County will not significantly reduce the sales prices of properties in the vicinity of the Project Area.

Table 16-2. Additional Comparative Demographic Data for Counties with Wind Farms in Iowa, Minnesota and South Dakota

County	State	Population	% Rural	Mean Size of Farms[1]	% Agriculture Employment[2]
Sac	IA	10,436	60	429	9.1
Franklin	IA	10,035	100	409	12.5
Cottonwood	MN	11,633	62	450	3.7
Jackson	MN	10,629	69	402	11.0
Weighted Average3			**72.2**	**423.3**	**8.9**
Clark	SD	3,645	100	894	25.4
Codington	SD	27,938	22	557	4.9
Grant	SD	7,241	55	639	16.7
Weighted Average[3]			**36.3**	**606.7**	**9.3**

1 Acres
2 Agriculture, Fishing, Forestry and Hunting
3 Weighted by population

Similarly, the SDPUC has previously concluded that there is "no record evidence that property values will be adversely affected. *In the Matter of the Application of Dakota Range I, LLC and Dakota Range II, LLC for a Permit of a Wind Energy Facility in Grant County and Codington County, South Dakota for the Dakota Range Wind Project*, Docket No. EL18-003, Final Decision and Order Granting Permit to Construct Wind Energy Facility, Notice of Entry Para. 55 (July 23, 2018). The SDPUC found similarly in the Crocker Wind Farm docket: "There was no credible showing that there will be quantifiable or qualitative effect on property value." *In the Matter of the Application by Crocker Wind Farm, LLC for a Permit of a Wind Energy Facility and a 345 kV Transmission Line in Clark County, South Dakota, for Crocker Wind Farm, Docket No. EL17-055, Final Decision and Order Granting Permit to Construct Facilities and Notice of Entry, ¶ 60 (June 12, 2018).*

MaRous & Company recently completed a market impact study for the Dakota Range Wind Project III (January 2019). This study concluded that there is no market data indicating the Dakota Range Wind Project III project would have a negative impact on either rural residential or agricultural property values in the surrounding area. Further, the study found that market data from South Dakota supports the conclusion that the project would not have a negative impact on rural residential or agricultural property values in the surrounding area. Finally, for agricultural properties that host turbines, the additional income from the wind lease may increase the value and marketability of those properties.

16.1.3 Mitigation Measures for Socioeconomic and Community Impacts

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

16.2 Commercial, Industrial and Agricultural Sectors

16.2.1 Existing Commercial, Industrial and Agricultural Sectors

The Project Area is agricultural (predominantly cropland and grassland/pasture). No commercial, industrial, mining or institutional land uses are located within the Project Area. Therefore, no mitigation measures are proposed.

In 2012, Hyde County's 207 farms encompassed a total of 514,618 acres (average farm size of 2,486 acres) and produced $94.3 million in agricultural products (USDA 2012). Sixty-seven percent of sales were from crop sales and 33 percent was livestock sales. The majority of crop acreage was corn and wheat. Cattle and calves were the largest livestock component in the county. Hyde County ranked 48th of the 66 South Dakota counties in total value of agricultural products sold.

16.2.2 Impacts to Commercial, Industrial and Agricultural Sectors

Less than 1 percent of the existing agricultural land within the Project Area will be removed from long-term crop and forage production by the Project, primarily the area around wind turbine foundations, access roads and interconnection facilities. Landowners will be compensated by Triple H for losses to crop production during construction. Agricultural activities can occur up to the edge of access roads and turbine pads. The buried underground collection system will not alter agricultural activities.

Approximately 540 acres of agricultural land (including cropland and pastureland identified in Table 9-3) will be temporarily impacted by Project construction for collection lines and workspace around each turbine foundation. It is estimated that approximately 70 acres of agricultural land will be impacted long-

term, which constitutes 0.3 percent of the total land within the Project Area. Approximately 24.7 acres of prime farmland will be impacted long-term, which constitutes approximately 0.1 percent of the total land within the Project Area. Areas disturbed due to construction that will not host long-term operational Project facilities will be restored and will returned to its prior agricultural use.

16.2.3 Mitigation Measures for Commercial, Industrial and Agriculture Sectors

The mitigation measures for impacts to agricultural lands are described in Section 11.1.3.

16.3 Community Facilities and Services

16.3.1 Existing Community Facilities and Services

Table 16-1 identifies communities within the vicinity of the Project Area which will have facilities and services such as hospitals, police, fire and ambulance services, schools, churches and parks and recreational facilities. Electrical service in the Project Area is provided by Dakota Electric Cooperative. The Project is not located within a rural water system.

16.3.2 Impacts to Community Facilities and Services

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

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

16.3.3 Mitigation Measures for Community Facilities and Services

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

16.4 Transportation

16.4.1 Existing Transportation

16.4.1.1 Ground Transportation

In general, the existing roadway infrastructure in and around the Project Area is characterized by state, county and township roads that generally follow section lines. Various local roads provide access to the Project and include both two-lane and gravel roads. In the agricultural areas, many landowners use private, single-lane farm roads and driveways on their property. The length of roads within the Project Area by jurisdiction are summarized in Table 16-3.

Table 16-3. Summary of Roadways within the Project Area

Road Type	Miles within Project Area
Federal Highways	0
State Highways	2.02
Local Roads	46.48
Total	**48.5**

16.4.1.2 Aviation

As discussed in Section 11.7.1, Highmore Municipal Airport is located approximately 4.1 miles north of the Project Area (Figure 1 in Appendix A). One other airport, Miller Municipal, is located approximately 23 miles east of the Project Area near the City of Miller. There are no other public airports in proximity to the Project Area. Triple H has not identified any private airstrips within the Project Area.

Air traffic may be present near the Project Area for crop dusting of agricultural fields. Crop dusting is typically carried out during the day by highly maneuverable airplanes or helicopters. The installation of wind turbines will create a potential for collisions with crop dusting aircraft. The turbines will be visible from a distance and lighted according to FAA guidelines. Triple H received DONHs for the preliminary array and has since submitted the current array to the FAA, which is currently under review. See Section 16.4.2.2 for more details.

16.4.2 Impacts to Transportation

16.4.2.1 Ground Transportation

During the construction phase, temporary impacts are anticipated on some public roads in the vicinity of the Project Area, however local traffic will continue to have safe access though the area. Roads will be affected by the transportation of equipment to and from the Project. Construction traffic will use the existing county and state roadway system to access the Project and deliver construction materials and personnel. During the construction phase, several types of light, medium and heavy-duty construction vehicles will travel to and from the Project Area, as well as private vehicles used by construction personnel. Triple H estimates that there will be up to approximately 45 large truck trips per day per foundation and up to 100 small-vehicle (pickups and automobiles) trips per day in the area during peak construction periods. Some roads may also be temporarily expanded along specific routes as necessary to facilitate the movement of equipment. Triple H expects to enter into road use agreements with Hyde County. Construction activities will increase the amount of traffic using local roadways, but such use is

not anticipated to result in adverse traffic impacts. Operation and maintenance activities will not noticeably increase traffic in the Project vicinity.

After construction is complete, traffic impacts during the operation phase of the Project will be minimal. A small maintenance crew driving through the area in pickup trucks on a regular basis will monitor and maintain the wind turbines and collector lines, as needed. There will be a slight increase in traffic for occasional turbine, collector substation repair and/or collector line repair, but traffic function will not be impacted as a result.

16.4.2.2 Aviation

Triple H will coordinate with the Highmore Municipal Airport, the FAA and South Dakota Department of Transportation (SDDOT) prior to construction to understand potential impacts.

The Project has received "Determination of No Hazard" from the FAA for a preliminary array for turbine locations up to 535 feet. Form 7460 filings have been submitted for the current array at a height of 499 feet and are under review. Given that the current filing is in the same general area of the prior filing and utilizing shorter turbines, it is anticipated that DONHs will be issued by the FAA.

If taller turbines are used or if the Project layout changes from what has been previously provided to the FAA, Triple H will re-file with the FAA.

The installation of wind turbine towers in active croplands will create a potential collision risk with crop dusting aircraft. Triple H will notify local airports about the Project including locations of MET towers in the area to minimize impacts and reduce potential risks to crop dusters.

16.4.3 Mitigation Measures for Transportation

16.4.3.1 Ground Transportation

Given the increased road use in the Project Area during construction, Triple H will coordinate with local road authorities to establish road use agreements that will be in place prior to construction to ensure the safe and efficient use of roads and to minimize and mitigate the overall impact. Existing roads will be used when possible, but only in safe and environmentally sound locations. In locations where new access roads are necessary, they will be designed and constructed to the appropriate standard necessary to accommodate their intended function (e.g., traffic volume and weight of vehicles) and minimize erosion. Access roads that are not needed during operations will be decompacted, recontoured and revegetated.

When the Project is in the process of making road improvements, local traffic will either be directed safely through the work area or around on alternate routes, if needed. If practical, roads will be designed to allow two-way traffic so construction and local traffic will be able to use the roads during construction of the Project. Some delays or detours are expected during this phase to enable the installation of road improvements, but the Project will have plans in place to enable the traffic to move safely. Delays and detours will be similar in nature to what can occur during peak farming operations or other road improvements. Additional coordination will occur during peak harvest time to ensure farmers are able to utilize the public roads as well. Local Project management and support staff will be available on-site to address concerns or challenges that occur during construction. The Project will implement the following to minimize any adverse traffic impacts; improved roads to handle two-way traffic during construction,

proper signage, project-based speed limits, follow state/local road requirements, dust control, safety personnel on site and road agreements.

Project personnel and contractors will be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types and site-specific conditions to ensure safe and efficient traffic flow. During construction, O&M and decommissioning phases, traffic will be restricted to designated project roads. Use of other unimproved roads will be restricted to emergency situations.

The cost estimate to repair roads back to pre-construction conditions will be completed as part of final engineering and will depend on the plans for road upgrades as well as the turbine delivery plan. Triple H will enter road agreements with Hyde County and the impacted townships prior to construction and are expected to provide detailed engineering and financial security. Pursuant to SDCL 49-41B-38, Triple H will furnish an indemnity bond to secure the restoration and repair of roads after construction.

16.4.3.2 Aviation

Triple H will mark and light the turbines and the permanent MET tower to comply with FAA requirements and Hyde County Zoning Regulations under Section 9-104. Triple H will notify local airports about the Project and new towers in the area to reduce the risk to crop dusters. Triple H will work with landowners on coordinating crop dusting activities. The Permanent MET tower will be free-standing with no guy wires. Temporary MET towers that are already installed in the Project Area have supporting guy wires that are marked with safety shields (colored balls) and painted red and white for increased visibility.

16.5 Cultural Resources

16.5.1 Existing Cultural Resources

Cultural resources are the material remains of human activity and can include sites, buildings, districts and landscapes. Cultural resources are finite and non-renewable; once destroyed they and the information they provide are lost. Federal laws and regulations provide the standards for cultural resources identification, evaluation and mitigation of impacts. If a cultural resource site meets the criteria for listing on the National Register of Historic Places (NRHP), it is considered significant and termed a “historic property.” The Project layout was designed, in part, to consider impacts to cultural sites that may meet the criteria as historic properties.

Beaver Creek Archaeology, on behalf of Triple H is consulting consultation with the South Dakota State Historical Society (SDSHS) regarding the findings summarized below.

Beaver Creek Archaeology performed a file search and revealed two sites within a 1-mile radius of the Project Area (Table 16-4; Appendix K). These sites, HE00000031 and HE00000033, are both unevaluated historic barns. Both are located away from the proposed construction areas and will not be affected by construction as currently planned.

Table 16-4. Previously Recorded Cultural Resources

SHPO ID	Affiliation	Description	NRHP Status
HE00000031	Historic	Barn	Unevaluated
HE00000033	Historic	Barn	Unevaluated

SHPO = State Historic Preservation Office; ID = Identification

Beaver Creek Archaeology also conducted a Level III cultural resource survey of approximately 534 acres of turbine pads on November 15, 2018 and December 19, 2018 (Appendix K). The Area of Potential Effect (APE) stretches to the west of SD-47 which was used to access the Project. Additional survey will completed in the spring of 2019 for the access roads and collector lines; however, there is greater flexibility to revise those features if cultural resources are identified in the forthcoming surveys.

Three cultural resources were recorded during the course of the survey (Table 16-5). These are BCA18-1329-Site1, BCA18-1329-Site2 and BCA18-1329-Site3.

- Site BCA18-1329-Site1 is a solitary stone circle that is recommended as unevaluated for the NRHP.
- Site BCA18-1329-Site2 is a historic dump that is recommended as ineligible for the NRHP.
- Site BCA18-1329-Site3 consists of two stone circles and two stone cairns that is recommended as unevaluated for the NRHP.

As sites BCA18-1329-Site1 and BCA18-1329-Site3 are recommended as unevaluated, Beaver Creek Archaeology recommends that the sites be avoided by a minimum of 100 feet during construction activities or the proposed turbine pads these sites are on will be discarded from the wind Project plan if that avoidance is not possible. As site BCA18-1329-Site2 is recommended as ineligible, no avoidance is required.

Table 16-5. Newly Recorded Cultural Resources and Avoidance Measures

SITS #/Field Code	Affiliation	Description	NRHP Status	Avoidance Recommendation
BCA18-1329 Site 1	Period Unknown	1 Stone	Unevaluated	100’ avoidance or remove turbine from Project.
BCA18-1329 Site 2	Historic	Historic Dump	Ineligible	No avoidance.
BCA18-1329 Site 3	Period Unknown	2 Stone Circles, 2 Cairns	Unevaluated	100’ avoidance or remove turbine from Project.

16.5.2 Impacts to Cultural Resources

Triple H is committed to avoidance of all archaeological resources potentially eligible for listing in the NRHP, sites deemed culturally sensitive or sites that have not been evaluated for eligibility that are identified in further surveys. Potential impacts related to turbines will be avoided in the future as they will be within the requested 250-foot buffer area (see Section 4.2). There is greater flexibility to revise access roads and collector lines if cultural resources are identified in the forthcoming surveys.

16.5.3 Mitigation Measures for Cultural Resources

The Project will avoid impacts to cultural resources. Avoidance buffers (50-100 feet) will be placed around cultural resources that fall within these categories (potentially eligible sites, sites deemed culturally sensitive or sites that have not been evaluated for eligibility) to ensure that the Project exerts no adverse impacts on these resources. Any sites will be fenced along the avoidance buffer perimeter to reduce potential that they will be inadvertently disturbed during construction. An Unanticipated Discovery Plan will be prepared for the Project outlining the procedure to follow in order to prepare for and address any unanticipated discoveries of cultural resources, including previously undiscovered archaeological sites and possible human remains. This plan will provide direction to on-site personnel and their contractors as to proper procedure to follow if unanticipated discoveries occur during construction of the Project. If there are minor modifications to the layout based on final engineering, Triple H will conduct supplemental archaeology survey and commit to avoiding any NHRP-eligible sites that are identified. Therefore, no significant impacts on cultural resources are anticipated from the Project.

If human remains are identified during construction of the Project, work will immediately halt within a minimum of 100 feet of the site and the site will be protected until SDSHS and the South Dakota Archaeological Research Center are consulted, in addition to any involved Tribes that express interest in the Project and identify a potential impact.

If confirmed or potential human skeletal remains are discovered, the Hyde County Sheriff's office will also be contacted. If the remains are determined not to be part of an active crime scene or investigation, the South Dakota Chief Archaeologist will be contacted.

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

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

As discussed in Section 16.1.2, the Project is expected to employ approximately 200 temporary construction workers during an estimated 8 month peak construction period to support Project construction. It is likely that general skilled labor is available in the surrounding counties or the state to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for certain components of Project construction. It is likely that this labor will be imported from other areas of the state or from other states, as the relatively short duration of construction makes special training of local or regional labor impracticable.

The estimated number of construction jobs by classification and annual employment expenditures during construction are included in Tables 17-1 and 17-2; however, the number of jobs during the peak of construction may be higher.

Table 17-1. Estimated Construction Jobs and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Crane Operators	15	460,000-85,000
Civil Workers	20	$60,000-85,000
Construction Workers	30	$60,000-85,000
Collection Workers	15	$60,000-85,000
Tower Erectors	50	$60,000-85,000
Substation Workers	20	$60,000-85,000
Foundation Workers	25	$60,000-85,000
Testing and Inspections	10	$60,000-85,000
Design Engineers	15	$60,000-85,000

The estimated number of jobs by classification and annual employment expenditures during operation are included in Table 17-2. Annual estimated employment expenditures are anticipated to be the same for each of the first 10 years of commercial operation.

Table 17-2. Estimated Annual Operation and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Facility Managers	2	$180,000 – 225,000
Site Engineer	1	$75,000-90,000
Wind Turbine Technicians	13-15	$50,000-65,000
Administrative	1	$40,000-55,000

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18.0 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.*

The Triple H Project as proposed is a standalone project that will be built as described in this Application. Separately, Triple H's parent company has other interconnection positions in the area to support additional projects if they are found to be viable either economically or based on the capacity limits as determined through the interconnection process.

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19.0 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.*

A Decommissioning Plan and estimated cost analysis was prepared for the Project and is included in Appendix L. The estimated net decommissioning costs for the Project are summarized in Appendix A of the Decommissioning Plan. The net decommissioning cost (in 2018 US dollars) is estimated to be $6,604,719 assuming salvage and no resale of Project components. The current cost of decommissioning the Project is estimated to be approximately $71,790 per turbine or $26,419 per MW (based on 2.72 MW turbines) in 2018 dollars. This cost includes a partial offset from the salvage value of the towers, turbine components and electrical equipment. The detailed reclamation cost estimate is provided in Appendix B of the Plan.

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20.0 RELIABILITY AND SAFETY (ARSD 20:10:22:33:02 (08))

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:*
(8) Reliability and safety;

20.1 Reliability

Reliability (availability) as related to wind energy is defined as the percentage of time that a turbine will be functioning at full capacity during appropriate wind conditions at a site with specified wind resource characterization for a specified period of time, such as the life of the facility (Hill, Stinebaugh, Briand, Benjamin and Lindsay 2008). The Project is located in one of the windier areas of South Dakota and has been determined to be economically viable as based on the PPAs that have been executed by the Project.

20.2 Safety

The Project is located in a rural setting. Construction and operation of the Project will have minimal impacts on the security and safety of the local populace. Triple H and its construction team will coordinate with first responders, including but not limited to air ambulance, local sheriff's office(s) and local fire services to develop an emergency management plan during construction and operation of the Project. Triple H will also be in contact with local first responders to offer information about the Project and to answer any questions response teams may have regarding Project plans and details. The following security measures will be taken to reduce the chance of physical and property damage, as well as personal injury, at the site:

- The wind turbines will be setback from occupied homes as described in this Application and the applicable regulations identified herein. Distances from participating homes are considered to be safe based on developer experience and are consistent with prior Facility Permits. Setbacks from non-participating residences exceed industry standards and any impacts from turbines is negligible.
- Security measures will be taken during the construction and operation of the Project including temporary (safety) and long-term operational fencing, warning signs and locks on equipment and wind power facilities.
- Regular maintenance and inspections will be implemented to minimize the potential for blade failures.
- Turbines will sit on steel enclosed tubular towers within which all electrical equipment will be located, except for the pad-mounted transformer where applicable.
- Access to the interior of the tower is only through a solid steel door that will be locked when not in use.
- The permanent MET tower will be free-standing. The guy wires on temporary MET towers will have color sleeves or marker balls at ground level to increase visibility.
- Where necessary or requested by landowners, Triple H will construct gates or fences.

- The foundation and tower design of the wind turbine will be certified by a professional engineer to be within accepted professional standards.
- Safety training will be conducted, and standardized practices will be implemented for construction crews and on-site personnel.
- The Project will register each turbine location and the O&M facility with a rural address identifier as outlined in the South Dakota Rural Addressing Procedural Handbook.
- Triple H will coordinate with South Dakota One-Call and pipeline companies prior to commencement of construction activities and will register Project underground facilities with the One-Call program following construction.
- Icing conditions of the wind turbines will be monitored; if severe icing conditions are identified, control systems will either automatically or manually shut down until icing is no longer a concern.

The Project will have minimal waste as a result of operation and all required permits for handling contaminants will be obtained. Triple H has and will be in contact with local first responders to offer information about the Project and to answer any questions response teams may have regarding Project plans and details.

20.3 Electromagnetic Fields and Stray Voltage

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

Concerns about health effects of EMF from power lines were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields, such as those from high-voltage power lines, causes biological responses and health effects. 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 electromagnetic fields are present everywhere in our environment. Natural electric fields in the atmosphere range from background static levels of 10 to 120 volts per meter to well over several kilovolts per meter produced by the build-up of electric charges in thunderstorms. The Earth itself has a magnetic field that ranges from approximately 300 to 700 milligauss (mG). In addition to the presence of the earth's steady state electric field, an average home experiences additional magnetic fields of 0.5 mG to 4 mG which arise from the general wiring and appliances located in a typical home.

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. 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.

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21.0 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.

Refer to the Completeness Checklist in Section 1.4.1 of this Application for ARSD requirement details. Requirements specific to ARSD 20:10:22:33.02 (1-13) are addressed in various sections of this Application, as indicated in Table 21-1 below.

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

Information Request	Section
(1) Configuration of wind turbine	Section 4.1 and Section 4.2
(2) Number of wind turbines	Section 4.2
(3) Warning light requirements for wind turbines	Section 9.2.3.1 and Section 12.0
(4) Setback distances	Section 5.2 and Section 12.0; Figures 3a-3b
(5) Sound levels during construction and operation	Section 4.12 and Section 11.3
(6) Electromagnetic interference	Section 20.3
(7) Site and major alternatives	Section 5; Figures 3a-3b and Figure 12; Appendix B
(8) Reliability and safety	Section 20.1
(9) Right-of-way or condemnation requirements	Section 4.11.1
(10) Clearing activities	Sections 4.11, 6.0, 8.2.2.1 and 9.1.2.3
(11) Configuration of interconnection towers and poles	Sections 4.2–4.10
(12) Conductor and structure configurations	Section 4.10
(13) Underground electric interconnection facilities	Section 4.12.4

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

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

22.1 Permits and Approvals

The Applicant is responsible for undertaking all required environmental review and will obtain all permits and licenses that are required following issuance of the Energy Facility Permit. The potential permits or approvals that have been identified as being required for the construction and operation of the Project are shown in Table 22-1.

Table 22-1. Permits and Approvals

Regulatory Authority	Permit/Approval	Status
Federal Approvals		
USFWS–Huron WMD	Special Use Permit for temporary impacts on wetland and grassland easements	Avoided impacting all USFWS grassland easements with one exception. One existing easement superseded USFWS easements. No authorization required.
USACE	CWA Section 404 and Section 10 Permit(s)	Not anticipated - To be determined once layout is finalized.
USEPA (Region 8) in coordination with the South Dakota Department of Health	SPCC Plan	To be completed in conjunction with final engineering and design.
FAA	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	1st Quarter 2019—future revisions may be required depending on layout and/or determination expiration.
	Notice of Actual Construction or Alteration (Form 7460-2)	To be submitted as required during construction.
State of South Dakota Approvals		
South Dakota Aeronautics Commission	Aeronautical Hazard Permit	Will be completed after final design is complete.
SDPUC	Application for Energy Facility Permit	3rd Quarter 2019
SDSHS	Cultural and Historic Resources Review and Review of State and NRHP and Archeological Survey	1st Quarter 2019
SDDENR	Section 401 Water Quality Certification	Not anticipated unless Individual Section 404 Permit is needed from USACE.
	National Pollutant Discharge Elimination System General Stormwater Permit for Construction Activity	SWPPP would be prepared and Notice of Intent will be submitted after final design is complete.
	Temporary Water Use Permit for Construction Activities	If necessary, will be obtained prior to construction.

Table 22-1. Permits and Approvals

Regulatory Authority	Permit/Approval	Status
	Water Rights Permit for Non-irrigation Use	If necessary, will be obtained prior to construction.
	Temporary Discharge Permit	If necessary, will be obtained prior to construction.
SDDOT	Utility Permit	If necessary, will be obtained prior to construction.
	Oversize/Overweight Permit for State Highways	Will be obtained prior to construction.
	Highway Access Permit	If necessary, will be obtained prior to construction.
Local Approvals		
Hyde County Zoning Administrator	Conditional Use Permit	1st Quarter 2019
Hyde County Planning and Zoning Department	Building Permit and Soil Erosion and Sediment Control Plan	Will be obtained prior to construction.
Hyde County Planning and Zoning Department	Oversize/Overweight and Approach Permit	Will be obtained prior to construction.

22.2 Agency Coordination

Throughout Project planning, Triple H has coordinated with various federal, state and local agencies to identify agency concerns regarding the Project. Early interaction was completed in conjunction of the Tier 1 and 2 surveys (Appendix D). Following initial consultation, all coordination was setup informally by phone/email and conducted as conference calls. A summary of agency comments and coordination is provided below.

December 2018, Triple H also sent consultation letters to the following agencies:

- USFWS Huron Wetland Management District;
- South Dakota Ecological Services Field Office;
- USACE, Pierre Regulatory Office;
- USDA-NRCS;
- SDGFP;
- SDDENR, Division of Environmental Services; and
- SDDOT, Office of Project Development;

Agency response letters are provided in Appendix M.

22.2.1 USFWS

Triple H has coordinated closely with USFWS Ecological Services and the Huron WMD through meetings, conference calls and electronic communications. A conference call was held on October 19, 2016 and January 19, 2018, with the USFWS to discuss the results of the field surveys for the Triple H Wind Project pertaining to migratory birds, with specific focus on eagles. A summary of this meeting and other pertinent emails is included in Appendix N. The USFWS's applicable comments are summarized

below. Triple H provides a response to each of the topics below and elsewhere (as indicated) in this Application:

- USFWS easements: The Project is within the USFWS' Huron WMD. As discussed in Section 11.2.1, there are five wetland conservation easements and three grassland conservation easements in the Project Area. The USFWS noted that these conservation easements are held in perpetuity and that it would be advisable to avoid dredge/fill in wetlands within the wetland easements and any development that would result in grassland conversion. Wetland easements are depicted on the entire parcel although they're limited to wetlands and streams within that parcel. If facilities were to be placed within the easement areas, NEPA would be triggered. The USFWS Huron Office provided shapefiles of the conservation easements.
    - Triple H has been conducting ongoing coordination with the Huron WMD to review grassland and wetland easement data within the Project Area. Triple H and the USFWS discussed minimizing the impacts of turbines and associated infrastructure on grassland easements. The layout reflected in this Application balances setbacks, constructability, noise, shadow flicker, cultural resources, sensitive habitat and other factors.
    - Over a series of emails and calls, Triple H and the USFWS discussed the "top lease" of an existing wind easements that had been executed with the landowner and recorded in the appropriate land records before the USFWS implemented a grassland easement for all or a portion of the property (Rittel PID 21). The USFWS reviewed the grassland easement and concurred that the existing wind easements and their associated lease agreements supersede any USFWS easements that were established after the fact and determined that no authorization from the USFWS will be required as it relates to the wind easement. Triple H is avoiding grassland conservation easements and will avoid the delineated features associated with the wetland program.
- Threatened/Endangered species: The USFWS noted that the Project is within 75-80% of the whooping crane migration corridor. Further evaluation of the Project Area would be needed for stopover habitat during migration relative to adjacent areas and that Triple H should consider the potential for additional monitoring during migration periods.
    - Section 9.2, the Biological Summary (Appendix C) and the Whooping Crane Stopover Habitat Report include an evaluation of the Project Area in relation to potential whooping crane stopover habitat.
- Raptors: The USFWS suggested that although Project Area is outside of golden eagle breeding/nesting range, that there should be a 10-mile survey buffer for eagles.
    - Triple H sent a request to the Natural Heritage Database for any known raptor nests in the survey areas and coordinated with the SDGFP. Raptor nest surveys were conducted for the Project in the spring of 2016 and 2018. Section 9.2, Biological Summary (Appendix C) and the Raptor Nest Survey Report discusses eagles.

- Acoustic Monitoring for Bats: The USFWS noted the NLEB occurs across the state, hibernacula have occurred only in the Black Hills, but this species is being found in other areas such as along the Missouri River and woody drainages.
    - Section 9.2, Biological Summary (Appendix C) and the Bat Acoustic Surveys conducted during the summer and fall of 2016 and spring, summer and fall of 2018. Studies of bat activity followed the recommendations of the USFWS Land-based WEG and Kunz et al. (2007).

22.2.2 USACE

Triple H submitted a coordination letter to the USACE on December 26, 2018 to solicit input on the Project. The USACE responded on January 16, 2016 stating that if the final Project layout will impact any jurisdictional waters a Section 404 Permit would be required (Appendix M).

22.2.3 SDGFP

Triple H has conducted ongoing coordination with SDGFP through meetings, conference calls and electronic communications. In addition to the meeting held on October 19, 2016, between the USFWS and SDGFP, Triple H held additional meetings with the SDGFP on December 4, 2017 and December 13, 2018, to discuss the results of the Tier 3 WEG field surveys on migratory birds, with specific focus on eagles. A summary of these meetings and other pertinent emails are included in Appendices M and N. The USFWS's applicable comments are summarized below. Triple H provides a response to each of the topics below and elsewhere (as indicated) in this Application:

- Grassland birds: SDGFP indicated that known lek locations could be provided for Project planning. SDGFP recommended no new construction within 1 mile of known leks (No Surface Occupancy). SDGFP also recommended that construction occurring during the lekking period (March 1 to June 30) should avoid known leks by two miles (Timing Limitation). During post-construction (operational) periods, the SDGFP recommended timing limitation is 3 hours after sunrise between March 1 to June 30 for a distance of 2 miles to protect leks. No activity in this buffer is recommended. SDGFP provided recommendations for grouse lek buffers.
    - SDGFP provided Triple H known lek locations. Triple H conducted grassland avian use surveys and lek surveys (Section 9.2).
    - Triple H conducted surveys to document prairie grouse leks during the 2016 and 2018 breeding seasons within the 2016 and expanded Project Area. The objective of the prairie grouse lek survey was to collect pre-construction data to be used to help site the wind turbines to minimize impacts on prairie grouse. The layout reflected in this Application balances setbacks, constructability, noise, shadow flicker, cultural resources, sensitive habitat and other factors.
- Wildlife Surveys: SDGFP recommended surveying for swift fox (SGNC in SD). Historical records indicate swift fox have been recorded in the area so Triple H would need to make sure to address in future surveys or identify potential den sites, etc. within Project Area. Burrowing owls were also identified as another potential species in the area. Species concerns are addressed in Section 9.2 of this Application.

As described in Section 9.2.2.1, it is unlikely that the swift fox would be present in the Project Area. However, as described in Section 9.2.3, Triple H will avoid prairie dog towns to minimize disturbance to swift fox, burrowing owl and other species.

- Mitigation Offsets: SDGFP inquired about offsetting impacts to grassland that could be in the general vicinity. They suggested consideration of buying out rights to convert cropland to perennial grassland that could still be grazed, but with some level of grazing management. The intent would be to use this as an offset to the Project impacts to grassland. An option that has been used in South Dakota has been simply to offset the impact by making contributions to ongoing initiatives via Non-governmental organizations.
    - A mitigation plan is currently being developed that will be shared with SDGP for further discussion on this issue.

22.2.4 SDDENR

A coordination letter was submitted to the SDDENR on December 26, 2018. The SDDENR responded on January 28, 2019 stating that any construction activity that disturbs an area of one or more acres of land must have authorization under the General Permit for Storm Water Discharges Associated with Construction Activities and Surface Water Discharge Permit may be required if any construction dewatering would result from the Project (Appendix M).

22.2.5 SDSHS

Triple H completed a file search and Level III surveys (see Section 16.5.1). Beaver Creek Archaeology, on behalf of Triple H is consulting with the SDSHS regarding the results of the field surveys. Additional surveys for the access roads and collector lines are expected to be completed during spring 2019, as weather permits.

22.2.6 DoD

The DoD provided comments on December 2, 2016. The results of the informal review indicated that the Triple H Wind Project, as proposed on October 28, 2016, could potentially impact military operations conducted in the area. It was requested that Triple H contact the NORAD Radar Interference Branch to discuss the Project.

Triple H provided NORAD an informal review request on December 8, 2016. NORAD responded on December 9, 2016, that the Project would have a minor, but acceptable impact on their missions. NORAD did not have concerns at the time and will assess the Project formally filed with the FAA via OE/AAA.

Form 7460 filings have been submitted for the current array at a height of 499 feet and are under review. Given that the current filing is in the same general area of the prior filing and utilizing shorter turbines, it is anticipated that DONHs will be issued by the FAA. If taller turbines are used or if the Project layout changes from what has been previously provided to the FAA, Triple H will re-file with the FAA.

22.2.7 NTIA

The NTIA provided comments on June 17, 2016. After a 45+ day period of review, the Agency received responses from the USDA, Department of Commerce, Department of Justice, and Department of Navy stating, “no harmful interference anticipated.”

Triple H will continue to coordinate with NTIA on turbine placement and avoiding or minimizing potential impacts to telecommunications. Refer to Section 9.5.7.3 for potential mitigation measures.

22.2.8 Hyde County

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

- Hyde County completed a Zoning Ordinance update through the majority of 2018. Triple H personnel participated in this effort and responded to questions and inquiries from the county as well as provided information on the Triple H Wind Project.
- Project introduction summary and status update presentations to County Commissioners and Board of Adjustment;
- Coordination with Hyde County regarding the Triple H CUP application. The application was submitted on November 29, 2018.

22.3 Local Community Input

Triple H had two open house meetings regarding the Triple H Wind Project. The first occurred in the spring of 2018 while Hyde County was still updating their Zoning Ordinance. The second open house meeting occurred in December following the submittal of the CUP applications. Triple H participated in the Hyde County Zoning Ordinance update from 2017-18. As stated in Table 5-1 and Section 12.0, Triple H will comply with all adopted Hyde County setbacks in addition to voluntary environmental setbacks on other infrastructure and natural resources.

A poll was conducted by Mason-Dixon Polling & Strategy of Jacksonville, Florida from August 22 through September 9, 2018 (Appendix O). A total of 173 registered voters in Hyde County were interviewed by telephone. Those interviewed were selected randomly from a telephone-matched voter registration list that included both land line and cell phone numbers. The poll found that 74 percent of the interviewed voters support the building of new wind turbines in Hyde County, 22 percent opposed and 4 percent were undecided.

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

As described in Section 1.4, Triple H has addressed the matters set forth in SDCL Ch. 49-41B and in ARSD Ch. 20:10:22 (Energy Facility Siting Rules), related to wind energy facilities.

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

1. Will comply with all applicable laws and rules;
2. 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 Project Area;
3. Will not substantially impair the health, safety or welfare of the inhabitants; and
4. 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.

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

ARSD 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.*

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

Table 23-1: List of Individuals Providing Testimony

Individual	Company	Subject Matter
Casey Willis, Senior Project Developer	Engie North America	Overall development of the Triple H Wind Project; permitting/ environmental
Dave Mebane, Land Agent	Engie North America	Landowner relationships
Tricia Pellerin	Tetra Tech, Inc.	Sound and noise impact analysis
Ted Guertin	Tetra Tech, Inc.	Shadow flicker analysis
Clayton Derby	WEST, Inc.	Biology/Wildlife
Leslie Knapp	Tetra Tech, Inc.	Physical environment, hydrology, aquatic ecosystems, visual, water quality, and air quality
Michael MaRous	MaRous & Company	Market Impact Analysis
Jason Hellerud	Wanzek	Project Construction
Wade Burns	Beaver Creek Archaeology	Archaeological surveys
Dr. Mark Roberts	Health Impacts	Health Impacts

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