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May 2020

South Dakota Public Utilities Commission

Facility Permit Application

Docket No. EL-20_____

Wild Springs Solar Project

Pennington County, South Dakota

Submitted by:
Wild Springs Solar, LLC
8400 Normandale Lake Blvd Suite 1200
Bloomington, MN 55437

GERONIMO® ENERGY
a nationalgrid company

WILD SPRINGS SOLAR

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

Wild Springs Solar Project

Pennington County, South Dakota

May 15, 2020

WILD SPRINGS SOLAR, LLC

8400 Normandale Lake Boulevard

Suite 1200

Bloomington, MN 55437

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
Applicant	Wild Springs Solar, LLC
Application	Facility Permit Application
ARSD	Administrative Rules of South Dakota
Basin Electric	Basin Electric Power Cooperative
BBS	Breeding Bird Survey
BCC	Birds of Conservation Concern
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
CUP	Conditional Use Permit
CWA	Clean Water Act
dBA	A-weighted decibels
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
g	units of acceleration due to gravity
Geronimo	Geronimo Energy, LLC
GIS	Geographic Information System
GPA	Game Production Area
IPaC	Information, Planning and Consultation
HUC	Hydrologic Unit Code
kV	kilovolt
Land Control Area	Approximately 1,499-acre area of land consisting of approximately 1,419 acres of privately-owned land for which Wild Springs Solar, LLC has leases allowing siting and construction of the Project and the approximately 80-acre New Underwood Substation parcel
Lazard	Lazard Levelized Cost of Energy Analysis (version 13.0)
MBTA	Migratory Bird Treaty Act
MW	megawatt
NEPA	National Environmental Policy Act
NLEB	northern long-eared bat
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

Acronym/Abbreviation	Definition
NRI	Nationwide Rivers Inventory
O&M building	operations and maintenance building
PEM	palustrine emergent wetland
PPA	Power Purchase Agreement
Preliminary Development Area	Approximate 1,108-acre area in which the Wild Springs Solar Project preliminary layout is located
Project	Wild Springs Solar Project
PUB	palustrine unconsolidated bottom wetland
PV	photovoltaic
Rushmore Electric	Rushmore Electric Power Cooperative
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
SDNHD	South Dakota Natural Heritage Database
SDPUC	South Dakota Public Utilities Commission
SFHA	State Flood Hazard Area
SHPO	State Historic Preservation Office
SPCC Plan	Spill Prevention, Control, and Countermeasures Plan
SSURGO	Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
WAPA	Western Area Power Administration
WEST	Western Ecosystems Technology, Inc.
Wild Springs	Wild Springs Solar, LLC
WNS	White Nose Syndrome

1.0 INTRODUCTION

1.1 Project Overview

Wild Springs Solar, LLC (Wild Springs or Applicant) respectfully submits this Facility Permit Application (the Application) to the South Dakota Public Utilities Commission (Commission or SDPUC) for an Energy Facility Permit to construct and operate the Wild Springs Solar Project, a solar energy facility as defined under South Dakota Codified Law (SDCL) 49-41B-2(14) (the Project). The Project is located within an approximately 1,499-acre Project boundary on privately-owned land in Pennington County, South Dakota (Land Control Area), approximately one-half mile south of New Underwood, South Dakota (Figure 1 – Project Location).

The proposed Project will have an output of up to 128 megawatts (MW) of nameplate solar energy capacity. The Project's facilities will include:

- solar modules, inverters, and tracking racking;
- fencing;
- access roads;
- project substation;
- operations and maintenance building (O&M building) and parking lot;
- on-site belowground or aboveground electrical collection lines; and
- up to three weather stations (up to 20 feet tall).

Wild Springs will interconnect to the existing New Underwood Substation located in Section 5 of Township 1N, Range 11E via a 115 kilovolt (kV) transmission line of less than one mile. The exact transmission line routing to interconnect the Project into the substation has not yet been determined; however, it will be located within the Project's leased lands until it crosses over into the New Underwood Substation parcel.

The Project will interconnect to the New Underwood Substation, which is owned and operated by Western Area Power Administration (WAPA). Therefore, in addition to the requirements under South Dakota law and the Commission's regulations, Wild Springs must also comply with the requirements of the U.S. National Environmental Policy Act (NEPA). While WAPA must analyze impacts of the entire Project, WAPA's federal action is limited to the approval of the proposed interconnection. Wild Springs is currently preparing a Draft Applicant-prepared Environmental Assessment (EA) for the Project that will be reviewed by WAPA and is anticipated to be issued to the public for review in the second quarter of 2020.

Wild Springs is a wholly owned subsidiary of Geronimo Energy, LLC (Geronimo), a National Grid Company. Geronimo is a utility-scale renewable energy development company headquartered in Bloomington, Minnesota that has developed multiple operating wind farms and solar projects throughout the United States. Over 2,400 MW of wind and solar projects developed by Geronimo are either under construction or operational. Geronimo has a multi-gigawatt development pipeline of wind and solar projects in various stages of development throughout the United States and 97 utility-scale and community solar projects completed. Geronimo provides custom renewable energy development solutions for utilities, independent power purchasers, and corporations looking to harness renewable energy for business growth. Geronimo's founder has

an agricultural background, and the first Geronimo project is sited solely on his land. Geronimo prides itself on developing wind farms and solar facilities that are farmer-friendly, community-driven, and beneficial for rural communities.

1.2 Names of Participants (ARSD 20:10:22:06)

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:

- Mollie Smith and Haley Waller Pitts
  Fredrikson & Byron, P.A.
  200 South 6th Street, Suite 4000
  Minneapolis, MN 55402
  612-492-7270, 612-492-7443
  msmith@fredlaw.com, hwallerpitts@fredlaw.com

- Melissa Schmit
  Geronimo Energy, LLC
  8400 Normandale Lake Boulevard, Suite 1200
  Bloomington, MN 55437
  952-988-9000
  melissa@geronimoenergy.com

1.3 Name of Owner and Manager (ARSD 20:10:22:07)

The Applicant will construct, own, operate, and manage the Project. Melissa Schmit is the primary contact for the Applicant. The Applicant currently holds the land rights necessary to facilitate development of the Project as proposed.

1.4 Facility Permit Application Content and Organization

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

- Physical (geology, economic deposits, soils)
- Hydrology (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, telecommunications)
- Air quality
- Communities (socioeconomics, cultural resources, transportation)

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

1.4.1 Completeness Check

The content required for an application with the SDPUC is described in SDCL 49-41B and further clarified in ARSD 20:10:22:01(1) et seq. The SDPUC submittal requirements are listed in Table 1-1 with cross-references indicating where the information can be found in this Application.

Table 1-1: Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(1) thru (12)	20:10:22:05	**Application contents.** The application for a permit for a facility shall contain the applicable information specified in §§ 20:10:22:06 to 20:10:22:25, inclusive, 20:10:22:36, and 20:10:22:39. 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 11.1
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

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
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.	Sections 4.0, 9.5.1, Figures 1, 2, and 13.
49-41B-11(6); 49-41B-21; 34A-9-7(4)	20:10:22:12	**Alternative sites.** The applicant shall present information related to its selection of the proposed site for the facility, including the following: (1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria; (2) An evaluation of alternative sites considered by the applicant for the facility; (3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	Section 7.0

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:13	**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 4.4, 5.0 and 9.0

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 9.1; Figures 1, 8, 9, and 10; Appendix E

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 9.2; Figures 8 and 11; Appendices B, E, and F

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:16	**Effect on terrestrial ecosystems.** The applicant shall provide information on the effect of the proposed facility on the terrestrial ecosystems, including existing information resulting from biological surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected within the transmission site, wind energy site, or siting area; an analysis of the impact of construction and operation of the proposed facility on the terrestrial biotic environment, including breeding times and places and pathways of migration; important species; and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 9.3; Appendices G and H
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 9.4; Figure 11

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.	Sections 8.0, 9.1.1.1, and 9.5; Figures 12 and 13; Appendices I and J

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
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 8.0
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 9.2
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 9.6
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 6.0

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
49-41B-11(10, 11); 49-41B-22	20:10:22:23	**Community impact.** The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility will have on the anticipated affected area including the following: (1) A forecast of the impact on commercial and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities or services; (2) A forecast of the immediate and long-range impact of property and other taxes of the affected taxing jurisdictions; (3) A forecast of the impact on agricultural production and uses; (4) A forecast of the impact on population, income, occupational distribution, and integration and cohesion of communities; (5) A forecast of the impact on transportation facilities; (6) A forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance. The information shall include the applicant's plans to coordinate with the local and State office of disaster services in the event of accidental release of contaminants from the proposed facility; and (7) An indication of means of ameliorating negative social impact of the facility development.	Sections 9.7 and 9.5.2

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
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 9.7.1
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 10.0
49-41B-35(3)	20:10:22:33	**Decommissioning of energy facilities.** The applicant shall provide a plan or policy statement on action to be taken at the end of the energy conversion facility's on-line life. Estimates of monetary costs, site condition after decommissioning, and the amount of land irretrievably committed shall be included in this statement.	Section 5.0; Appendix D
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 11.0; Appendix A
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 12.0

Table 1-1: Completeness Checklist			
SDCL	**ARSD**	**Required Information**	**Location**
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. An applicant for an electric transmission line, a solar energy facility, or a wind energy facility that holds a conditional use permit from the applicable local units of government is determined not to threaten 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. An applicant for an electric transmission line, a solar energy facility, or a wind energy facility that holds a conditional use permit from the applicable local units of government is in compliance with this subdivision.	Sections 8.0 and 9.0; Section 11.4

1.4.2 Overview of NEPA Process

As previously mentioned, since WAPA's execution of an interconnection agreement with the Project constitutes a federal action, Wild Springs is currently preparing a Draft Applicant-prepared EA for the Project interconnection in accordance with applicable NEPA requirements. The EA will assess the environmental impacts of the solar project and identify best management practices (BMPs) and avoidance and mitigation measures to address potential impacts. WAPA held a public scoping meeting at the New Underwood Community Center on March 3, 2020. The meeting was attended by approximately 30 people. The public scoping period closed on April 3, 2020. The draft EA is currently being prepared, including comments received during the public scoping period. Wild Springs anticipates that WAPA will approve a final EA and issue a Finding of No Significant Impact (FONSI) in the winter of 2020/2021. While WAPA must analyze impacts of the entire Project, WAPA's federal action is limited to the approval of the interconnection.

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

The Project will have an output of up to 128 MW of nameplate capacity. The electricity generated by the Project will interconnect to the existing New Underwood Substation, which is owned and operated by WAPA. Wild Springs has entered into a Power Purchase Agreement (PPA) with Basin Electric Power Cooperative (Basin Electric), who is taking the entire output of the Project for 15 years, starting in 2022. Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota. It generates and transmits electricity to 141-member rural electric systems in nine states: South Dakota, Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, and Wyoming. These member systems distribute electricity to about 3 million consumers.

Wild Springs bid into the Basin Electric 2019 Power Supply Request for Proposal, which was issued on February 5, 2019. In September 2019, Basin Electric's Board approved contracting for up to 300 MW of solar. The Wild Springs PPA was executed and approved by Basin Electric's Board on November 8, 2019. The parties' press release announcing the deal is included in Appendix A.

According to Basin Electric's 2018 annual report, its system is growing at 1.16 percent per year, faster than the nationwide average growth of 0.64 percent. Basin Electric's 30-year growth forecast calls for 2,000 MW of new load. Over the past two years, Basin Electric has relied on short-term purchases to meet customers' capacity need. At the time of the RFP, Basin Electric was looking to add some longer-term contracts for electric capacity and also for wind and solar. While Basin Electric has previously contracted for wind projects, the RFP was its first foray into solar energy.

Basin Electric provides electric generation and transmission to two rural electric cooperatives and three Generation and Transmission (G&T) cooperatives in South Dakota. Together, these organizations deliver electric energy to over 180,000 accounts (homes and businesses) in the state. Among those cooperatives is Rushmore Electric Power Cooperative (Rushmore Electric), the G&T cooperative in which the Project is located. In addition to providing energy to customers, Rushmore Electric's CEO Vic Simmons pointed out that the Project will be beneficial to supporting the electric grid. In an October 19, 2019 letter to Justin Pickar of Geronimo, Mr. Simmons noted that:

"*The electrons that serve us come from the dams on the Missouri River, from the Laramie River Station in Wheatland, WY and through the DC tie at Rapid City from the Dry Creek Plant in Gillette, WY. Nothing is local and is dependent on the 155 kV and 230 kV transmission systems to deliver the power and the voltage needed. I reference voltage as well as power because we are at the end of the system in Western South Dakota and voltage support is often as critical as having enough power to serve the load. The Wild Springs Solar Project will supply a local source for power and voltage to our systems."*

Mr. Simmons's letter is included in Appendix A.

As discussed below, the proposed Project would install up to 128 MW of solar generating capacity in South Dakota that would contribute to satisfying utilities' and consumers' energy demands, and meet utility renewable requirements or individual sustainability goals.

2.1 Cost and System Benefits of Solar Power

Although South Dakota has one of the smallest populations of any state, due to its energy-intensive industries (i.e., agriculture, manufacturing, and mining), hot summers, cold winters, and periodic droughts, South Dakota is one of the top 10 states in total energy consumption per capita. The solar irradiance in southwestern South Dakota is on par with irradiance in Arkansas, Kentucky and Northern Mississippi. In 2019, South Dakota ranked 50th out of 50 states in installed solar capacity. Once constructed, Wild Springs will be the largest solar facility in South Dakota.

The Lazard Levelized Cost of Energy Analysis (version 13.0) (Lazard) provides an in-depth study of the levelized cost of all types of energy production, including renewable energy resources and more traditional technologies (Lazard, 2019).

Based on this analysis, utility scale solar provides electricity during daylight hours at a cost per MW-hour on par, or less than, many gas-fired electric generators. New solar energy facilities are less expensive to construct than new conventional energy sources, even without government subsidies. Table 2.2-1 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 MW-hour than conventional sources.

Table 2.2-1: Unsubsidized Levelized Cost of Energy

	Energy Source	Levelized Cost ($/MW hour)
Alternative Energy	Geothermal	$69-112
	Solar Photovoltaic	$32-42
	Wind	$28-54
Conventional Energy	Natural Gas Combined Cycle	$44-68
	Gas Peaking	$150-199
	Nuclear	$118-192
	Coal	$66-152

Competitive solar energy pricing results in clean and cost-effective on-peak energy that can replace the decline in older conventional energy facilities such as coal plants. Solar energy provides a solution to fill the production void in the Midwest with competitively priced on-peak power.

2.2 Additional Considerations

Energy produced by the Project will provide significant, numerous, and varied societal benefits. The shift to solar energy decreases air pollution, greenhouse gas emissions, conserves water resources, increases U.S. energy security by development of diversified generation resources, reduces fossil fuel demands, reduces energy costs to consumers, and generates well-paying jobs.

The Project is not expected to have material negative impacts on other possible developments in Pennington County. However, the Project will provide significant benefits to the local economy and local landowners. The Project would benefit landowners in the Land Control Area with average annual lease payments and Wild Springs has announced and is committed to creating an independently directed education fund. Because the Project is located within the New Underwood school district, the fund will be distributed to this district. New solar energy infrastructure will also provide an additional source of revenue for the State, school district, and county in which the Project is sited.

The Project will also provide significant income opportunities for local residents. Construction of the Project is anticipated to generate approximately 150 construction-related jobs at peak demand and four permanent operations and maintenance positions. The Project has already created significant landowner payments along with consulting, management, and environmental work. A detailed discussion of the socioeconomic benefits of the Project is presented in Section 9.7.1.

Once constructed, the additional economic impact of the Project to the area will provide resources that can be used to invest in future development opportunities. The Project also has the potential to help contribute to making the energy those residents rely upon less susceptible to volatility (DOE, 2016). The development of solar energy technology now makes solar power price-competitive with new natural gas and coal generation (Lazard, 2019). The development of solar energy in South Dakota reduces dependence on fossil fuel markets and helps keep energy dollars in South Dakota (DOE, 2016).

2.3 Consequences of Delay or Termination of Construction

If the proposed Project is not constructed or is delayed, Basin Electric's efforts to obtain renewable energy in a cost-effective and reliable manner would be in jeopardy. In addition, the Investment Tax Credit started to phase down at the end of 2019, meaning that an extended delay could result in increased costs. Additionally, Project costs are subject to commodity flux and rise. Therefore, if the Project is delayed, the probability of commodity price increase is greater.

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

3.1 Capital and Operational Costs

The total installed capital costs for the project are estimated to be approximately $190 million (~$1.5 million per MW). Ongoing operations and maintenance costs and administrative costs are estimated to be approximately $3 million per year when including plant operating costs, direct landowner agreement payments, annual capacity and production taxes and other costs.

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

4.1 Overall Project Description

Wild Springs Solar is currently developing the Wild Springs Solar Project, an up to 128 MW solar photovoltaic (PV) facility located in eastern Pennington County, South Dakota. The Project would interconnect into the New Underwood Substation, which is adjacent to the Project. Wild Springs selected this location based on several factors, but a key consideration in the selection process was the Project's proximity to existing electrical and transportation infrastructure, including the New Underwood Substation and existing transmission lines. Existing infrastructure in the immediate vicinity allows Wild Springs to minimize the need to construct ancillary facilities beyond the main Project footprint.

Table 4.1 lists the public land survey townships, ranges, and sections that are included in the Land Control Area as well as their county subdivision. A county subdivision can be a civil township or an unorganized territory. County subdivisions are typically used for census data and reporting whereas public land survey data is used for legal descriptions. In this portion of South Dakota, public land survey townships do not always have a single corresponding civil township; in some cases, multiple public land survey townships are within a single unorganized territory. Figure 1 shows the Project's location with county subdivisions (unorganized territories) and public land survey.

Table 4.1 Project Location

	County Subdivision, U.S. Census	Public Land Survey		
County	Unorganized Territory	Township	Range	Sections
Pennington	Rapid City East	1N	10E	1
Pennington	Rapid City East and East Central Pennington	1N	11E	5-9
Pennington	East Central Pennington	2N	10E	36
Pennington	East Central Pennington	2N	11E	31

Wild Springs has obtained lease agreements for approximately 1,419 acres of privately-owned land within the total 1,499-acre site (Land Control Area). While not under lease, the 80-acre WAPA substation parcel has been included in the Project boundary and surveyed to allow for future routing of transmission structures to interconnect the Project. The Project's preliminary design shows Project facilities within an approximately 1,108-acre area within the Land Control Area (Preliminary Development Area). There are approximately 391 acres of the Land Control Area for which Wild Springs has site control, but are currently not contemplated for occupation by solar facilities. Figures 2 and 3 (Land Control Area and Land Ownership, respectively) show the Land Control Area for which Wild Springs has solar lease agreements and the land ownership within half mile. The portion of the Land Control Area not utilized by the Project can be utilized by the landowner for agricultural purposes and may also be released from the leased area. Wild Springs depicts the current Preliminary Development Area within the Land Control Area on applicable figures for reference.

The Wild Springs Solar Project is located one half mile south of New Underwood and approximately 13 miles east of Rapid City. Wild Springs selected the specific Land Control Area based on significant landowner interest, transmission and interconnection suitability, optimal solar resource, and minimal impact on environmental resources (see Sections 2.0 and 7.1). Wild Springs has entered into lease agreements with landowners for all the parcels on which the Project would be constructed.

In this Application, Wild Springs is providing a preliminary Project layout within the Preliminary Development Area, which is subject to final micrositing. The Project's facilities include solar panels and racking, inverters, security fencing, laydown areas, Project substation, an O&M building, on-site below-ground or above-ground electrical collection and communication lines, and up to three weather stations (up to 20 feet tall). The preliminary Project layout reflects Wild Springs' effort to maximize the energy production of the Project and comply with applicable setbacks, while minimizing impacts to the land, environmental features, and surrounding community.

The final site layout may, however, differ from the preliminary layout and the current boundaries of the Preliminary Development Area set forth in this Application, but will not extend beyond the outer boundaries of the Land Control Area. While Wild Springs expects that the final layout will remain very similar to the preliminary layout presented in Figures 4 and 5a-d (Preliminary Project Layout and Detailed Preliminary Project Layout) and Appendix B - Site Plan, changes may occur as a result of ongoing site evaluation (e.g., geotechnical analyses), permitting processes, landowner recommendations and preferences, and micro-siting activities. Therefore, Wild Springs requests that the permit allow Project facilities to be shifted within the Land Control Area so long as the facilities avoid impacts to cultural resources, avoid the then active burrows within the 2019-mapped prairie dog colonies extent and avoid wetland impacts or impacts are in compliance with applicable U.S. Army Corps of Engineers (USACE) regulations. Project facilities are described in more detail in Section 4.2.

4.2 Design

The Project will utilize PV panels with tempered glass varying in size approximately 4 to 7 feet long by 2 to 4 feet wide, and 1 to 2 inches thick. The panels will be installed on a tracking rack system that utilizes galvanized steel and aluminum for the foundations and frame with a motor that allows the racking to rotate from east to west throughout the day. Each tracking rack will contain multiple panels. On the tracking rack system, panels will be approximately 15 feet in height from the ground to the top of the panels when at a 45-degree angle (refer to Image 1 below). Height may vary due to manufacturer, topography and vegetation constraints and could reach a height of approximately 20 feet from the ground. The PV panels will have a silicon and weatherized plastic backing or a side-mount or under-mount aluminum frame, heat strengthened front glass, and laminate material encapsulation for weather protection.

To limit reflection, solar PV panels are constructed of dark, light-absorbing materials. Today's panels reflect as little as two percent of the incoming sunlight depending on the angle of the sun and assuming use of anti-reflective coatings, which will be used for the Project. The solar arrays will occupy most of the Project site for the solar facilities.

4.2.1 Linear Axis Tracking Rack System

A linear axis tracking rack system allows the PV panels to track the solar resource throughout the day. The panels and tracking rack system are generally aligned in rows north and south with the PV panels facing east toward the rising sun in the morning, parallel to the ground during mid-day, and then west toward the setting sun in the afternoon. The panels are rotated by a small motor connected to the tracking rack system to slowly track with the sun throughout the day. The tracking rack system allows the Project to optimize the angle of the panels in relation to the sun throughout the day thereby maximizing production of electricity and the capacity value of the Project.

The tracking rack system is mounted on top of steel piers that are typically driven into the ground, without the need for excavation or concrete to install the piers. Piers are typically installed at eight to fifteen feet below the surface, pending site-specific conditions that will be determined through geotechnical borings prior to construction. Images 1-3 below visually show the general racking equipment and dimensions of a linear axis tracking rack system.

Image 1 Tracking Rack System

Image 2 Approximate Tracking Rack System Dimensions

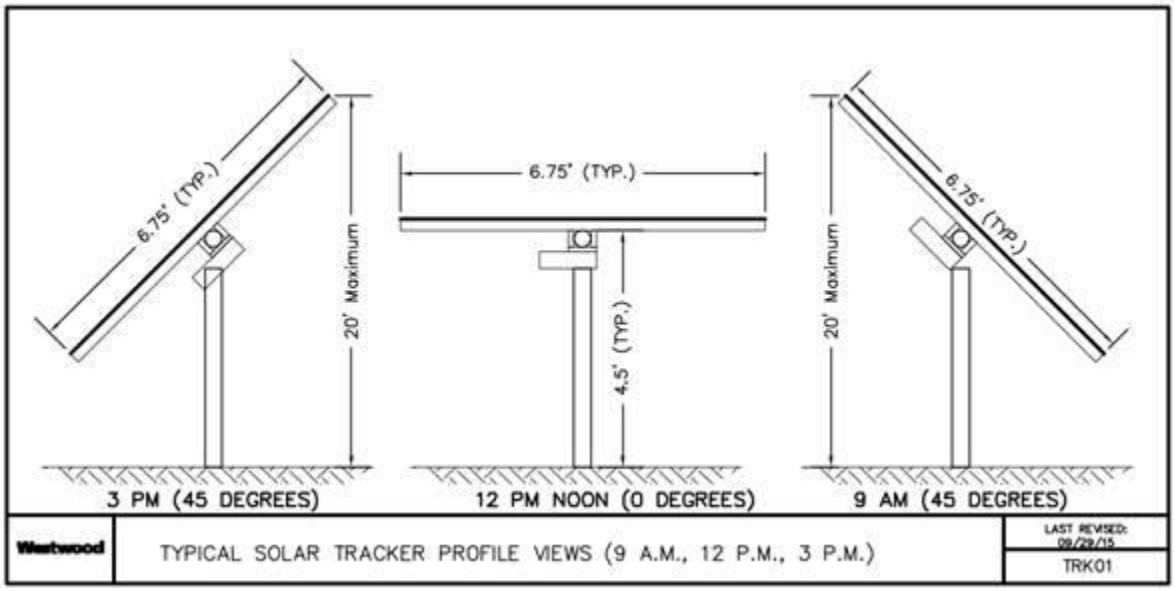


Image 3 Standard Steel Pier Foundations

4.2.2 Inverters, Transformers, and Electrical Collection System

Electrical wiring will connect the panels to inverters, which will convert the power from DC to AC. The AC will be stepped up through a transformer from the inverter output voltage to 34.5 kV and brought via the collection cables to the Project substation. The electrical collection system will be installed below-ground or a hybrid of below-ground and above-ground. Electrical collection technology is rapidly evolving and will be site-specific depending on geotechnical analysis, constructability, costs, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system. The electrical cables that would be used for each type of electrical collection system are described below.

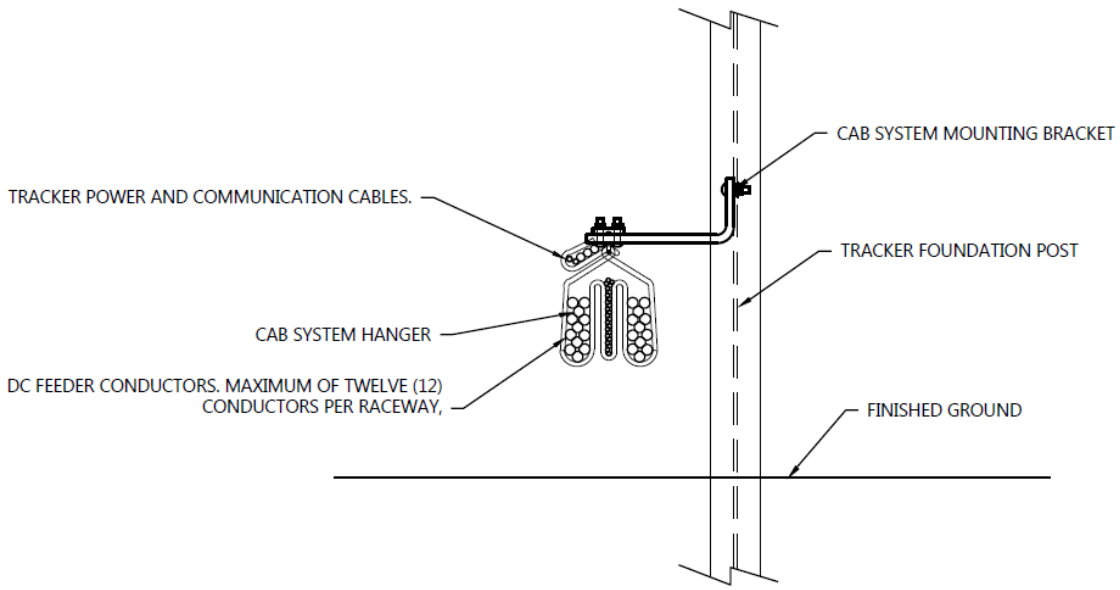
4.2.2.1 Below-ground Electrical Collection System

Inverters convert approximately 1,500 volts of DC output of the PV panels to between 650-950 volts of AC. Then a step-up transformer converts the inverter AC voltage to an intermediate voltage of 34.5kV. The panels deliver DC power to the inverters through cabling that will be located in a below-ground trench (approximately four feet deep and one to two feet wide). Below-ground AC collection systems from the inverter skids to the substation will be installed in trenches or ploughed into place at a depth of at least four feet below grade. During all trench excavations the topsoil and subsoil will be removed and stockpiled separately. Once the cables are laid in the trench, the area will be backfilled with subsoil followed by topsoil.

4.2.2.2 Hybrid Electrical Collection System

A hybrid above-ground and below-ground electrical system is being considered for the Project for several reasons including ease of access for operations and maintenance, reduced ground disturbance, and cost considerations. If above-ground cabling is utilized, the DC collection cables will be strung under each row of panels on steel arms and a steel cable attached to the piles. At the end of each row, hanging brackets would connect several racks/rows of cables to a common collection point near their assigned inverter/transformer skid where the cables will be routed below-ground at a minimum depth of at least four feet below grade to the inverter/transformer skid where the current is converted to AC and voltage is stepped up to 34.5 kV. A typical drawing of the hanging brackets at the end of each row is provided below in Image 4. From the inverter/transformer skid, the AC collection would be below ground to the Project substation, as described above for the below-ground collection system.

Image 4 Typical Above-Ground DC Collection Hanging Bracket



4.2.2.3 Central Inverter/Transformer Skids

Regardless of the collection system configuration (below-ground or hybrid), the Project will utilize central inverter/transformer skids at locations throughout the Project and include a transformer to which the inverters will feed electricity (Image 5). The final number of inverters for the Project will depend on the inverter size, as well as inverter and panel availability. The Project's preliminary design proposes 89 central inverter skids (one inverter is required for every 2-3 MW). These skids provide the foundation for the inverter, transformer, and Supervisory Control and Data Acquisition (SCADA) system. The skids will be placed atop a concrete slab or pier foundations and typically measure 10 feet wide by 25 feet long, with a structure height of approximately 12 feet above grade (Image 5). Concrete foundations will be poured onsite or precast and assembled off-site.

The inverters are within the interior of the Project along access roads. Typical drawings of inverters are included in the Site Plan in Appendix B and Image 5 below shows a central inverter and step-up transformer station.

Image 5 Typical Inverter and Transformer Station

4.2.3 Access Roads

The Project will include approximately 20.0 miles of graveled access roads that lead to the Project facilities. The final length of the access roads will depend on the equipment selected and final engineering. These roads are up to 16 feet wide along straight portions of the roads and wider along curves at internal road intersections (approximately 45 feet). There are ten access points to the Project from existing county roads. These entrances will have locked gates.

Wild Springs has designed access roads for effective and efficient access for operations and maintenance and for safe ingress and egress of employees, visitors and emergency responders. Wild Springs has minimized the amount of access roads for the Project. For example, access roads provide access to all portions of the site and every central inverter, but not every block of panels has access roads along the entire perimeter (i.e., along the perimeter fence). This design minimizes the amount of ground disturbance and new impervious surfaces while still providing effective and efficient site access.

Some upgrades or other changes to the public roads may be required for construction or operation of the Project. Wild Springs will work with Pennington County to facilitate and pay for required upgrades that meet the required public standards. Upgrades or changes could include, but are not limited to, road improvements, additional aggregate, and driveway changes. Wild Springs will obtain any required permits for this work from Pennington County, as applicable.

4.2.4 Safety Features

Permanent security fencing will be installed along the perimeter of the solar arrays and Preliminary Development Area. Fencing will be secured to posts which will be directly embedded in the soil or set in concrete foundations as required for structural integrity. The fencing will consist of a chain link fence and will extend approximately 6 feet above grade with one foot of barbed wire to comply with the National Electric Code. Additional prairie dog exclusionary fencing options may be utilized for the Project such as chicken-wire below the chain link fence extending below grade. This fencing will be designed to prevent the public from gaining access to electrical equipment

which could cause injury. Additionally, the fencing will prevent larger wildlife from entering the facility.

The Project will also have security cameras. Wild Springs will have security lighting at the entrances that will be down lit. The typical pole height will be ten feet and lights will be manual by switch as well as motion activated if an intrusion is detected. There will be lights at each inverter that will be down lit and switch controlled for repair purposes. For more detail about the lighting proposed at the Project site, see Appendix B – Site Plan.

4.2.5 Associated Facilities

4.2.5.1 Project Substation

The Project substation will be a 34.5/115 kV step-up substation with metering and switching gear required to connect to the transmission grid. It will be designed according to regional utility practices, Southwest Power Pool Transmission System Operator Standards, Midwest Reliability Organization Standards, National Electrical Safety Code, and the Rural Utility Service Code. The area within the substation will be graveled to minimize vegetation growth in the area and reduce fire risk. The substation will be fenced with a 6-foot chain-link fence, topped with one foot of barbed wire for security and safety purposes. The substation's area will be approximately 150 feet by 150 feet once construction is complete.

4.2.5.2 Operation and Maintenance Building

An O&M building will provide access and storage for Project maintenance and operations and anticipates it will be located adjacent to the Project substation. The Project will obtain a building permit for the O&M building from Pennington County prior to construction. The O&M building will measure approximately 60 feet long by 40 feet wide and will be made of metal (similar to a pole barn). It will contain an office for the onsite Plant Manager, a technician room, restroom, and storage area for equipment to operate and maintain the Project. Equipment includes a SCADA cabinet, spare panels, spare parts for the substation and equipment to operate the substation, as well as safety equipment for working with live electricity.

4.2.5.3 Parking

A parking lot will be located adjacent to the O&M building and will be approximately 500 square feet with the final size being determined in accordance with the Pennington County Zoning Ordinance. The parking lot will be gravel or paved and have at least one parking spot per employee, with additional room for deliveries.

4.2.5.4 Weather Stations

The Project will include up to three weather stations up to 20 feet in height (see Image 6 below). The weather stations will be within the Land Control Area; the final locations will be determined following final engineering.

Image 6 Weather Station

4.2.6 Temporary Facilities

Wild Springs will utilize ten temporary laydown areas within the Preliminary Development Area, totaling 15.9 acres. These areas will serve both as a parking area for construction personnel and staging areas for Project components during construction. These laydown areas have been sited to avoid any tree clearing. After construction, nine of the laydown areas will be reseeded as described in Section 4.5.4; the laydown area adjacent to the Project substation and O&M building will become the parking lot described in Section 4.2.5 (see Figures 5a-d).

4.2.7 Stormwater Drainage Basins

Wild Springs has completed a review of drainage within the Land Control Area and the need for stormwater runoff mitigation according to the Pennington County Stormwater Quality Manual. While the vegetation that will be planted between the arrays would likely be sufficient to meet the stormwater BMP requirements, Wild Springs has preliminarily designed one drainage basin in the southwest portion of the Preliminary Development Area that covers 0.6-acre (see Figures 4 and 5a-d). The preliminary design avoids placing solar facilities in the drainage basin, which is located in an existing low area. This area will be vegetated with a wet seed mix that will help stabilize soils after rain events.

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

The Project will interconnect into the adjacent New Underwood Substation with a 115 kV transmission line, which is below the threshold of SDPUC jurisdiction. There will be a single dead-end structure within the Project substation and likely 2-3 additional structures between the Project substation and the New Underwood Substation. The transmission line's overall length is currently estimated to be less than one mile. The structures will likely be made of wood and will be less than 150 feet tall. The type of conductor will be determined following the completion of detailed electrical design.

4.4 Land Requirements

Table 4.4-1 describes the land requirements by Project facility for the Project. The sum of these facilities is equal to the 1,108.1 acres within the currently identified Preliminary Development Area. However, of those acres, only approximately 47.3 acres will be converted to land with impervious surfaces (i.e., the Project substation and O&M building, inverter skids, parking areas, and access roads). Other areas will be restored and revegetated, and the vegetation will be maintained throughout the life of the Project. See Section 9.0 of the Application.

Table 4.4-1 Estimated Project Facility Acreages within Preliminary Development Area

Project Facilities	Acres
Access Roads	40.0
Inverters	0.9
Project Substation	0.5
O&M Building	0.1
Laydown Areas (to be restored)	13.2
Laydown Area (to be converted to parking lot)	5.7
Solar Panels (fenced area)	1037.5
Stormwater Basin	0.6
Collection lines outside the fence	9.6
Project Total	**1108.1**

4.5 Project Construction

A variety of activities must be completed to carry the Project through construction. Below is a preliminary list of activities necessary to develop the Project. Pre-construction, construction, and post-construction activities for the Project include the following:

- Pre-construction
  - Geotechnical analysis
  - Design substation and electrical collection system
  - Design solar array, access roads, and O&M building
  - Underground utility discovery
  - Procure all necessary facility components (solar panels, tracking system, transformers)

- Construction
  - Site preparation, grubbing, and grading
  - Construct laydown areas and set up temporary job site trailers
  - Construct fencing
  - Civil construction of access roads
  - Install PV mounting posts
  - Install below-ground or above-ground collection system
  - Install electrical enclosure/inverter
  - Tracker installation
  - PV panel installation
  - Construct gen-tie line

- Post-construction
  - Restore disturbed areas not intended for permanent above-ground facilities (permanent above-ground facilities include the substation, O&M building, inverter skids and electrical cabinets, weather stations, and access roads)
  - Test facility
  - Begin commercial production

4.5.1 Construction Activities

During construction, equipment and work vehicles will travel to and from the site. Daily construction duration is anticipated to be consistent throughout the construction season when the majority of the access road construction, electrical and substation work is taking place. Typical construction equipment such as scrapers, dozers, dump trucks, watering trucks, motor graders, vibratory compactors and pile drivers, pickup trucks, and backhoes will be used during construction. Specialty construction equipment that may be used during construction will include:

- skid steer loader;
- medium duty crane;
- all-terrain forklift;
- concrete truck and boom truck;
- high reach bucket truck; and
- truck-mounted auger or drill rig.

Upon completion of construction, heavy equipment will be removed from the site. An overview of construction activities follows.

4.5.1.1 Geotechnical

Geotechnical and pull testing studies will be performed to determine the topsoil and subsoil types, and the mechanical properties of the soils. These variables will be used to engineer the solar array foundation system. Typically, the foundation is a steel pile, which is driven into the ground with a hydraulically powered high-frequency hammer mounted on a tracked carrier. The piles are installed at pre-defined locations throughout the array area to an embedment depth of 8 feet to 15 feet below grade, depending on soil properties and other factors.

4.5.1.2 Site Clearing & Vegetation Removal

After the necessary permits are received, construction will begin with the initial site preparation work, including utility locates within the Project boundary. Depending on timing of the start of construction, the Project may require the clearing of residual row-crop debris from the 2021 harvest season. Alternatively, and depending on construction timing, Wild Springs may plant a cover crop in Spring 2021 that is compatible with the Project's Vegetation Management Plan (VMP; Appendix C). This cover crop will stabilize soils if row crops are not planted that year.

4.5.1.3 Earthwork

Areas of the site to be graded will have topsoil and organic matter stripped and segregated from the subsoil (depending on the depth of grading cut). Some grading will be required to provide a more level workspace and maintain soil stability in areas with a slope greater than five percent (approximately 25 percent of the Land Control Area, however the areas that will be graded will be less as grading activities will be limited to the final development area). Topsoil shall have temporary and permanent erosion control and soil stabilization measures established in accordance with the Project's SWPPP. The earthwork activities will be completed using typical civil construction equipment – scrapers, bulldozers, front-end loaders, back-hoes or skid-steers.

4.5.1.4 Access Road Construction

As a component of earthwork, permanent access roads and permanent turnouts will be developed. This work will start with the stripping and segregating of topsoil materials from the anticipated 16-foot-wide road width. The subgrade materials will be compacted 16-feet wide to the specified compaction requirements as laid out by the civil and geotechnical engineer. After compaction is reached and verified, the road will be installed as designed, typically done with or without geo-fabric depending on the soil type, and then, with a surface of 4 to 12 inches of gravel. The gravel will be placed level with the existing grade to facilitate drainage and minimize ponding.

After gravel is installed and compacted to engineers' requirements, the Project drainage ditches will be shaped as identified on the final grading plan. Finally, the previously stripped and windrowed topsoil material will be re-spread throughout the disturbed area.

Topsoil removed from permanent access roads will be removed to suitable locations near the site of removal and spread across existing topsoil for storage. Storage locations will be identified (Global Positioning System [GPS] boundary and depth) and recorded on site maps to facilitate final reclamation after decommissioning.

4.5.1.5 Solar Array Construction

Once grading activities are complete, the racking system supports will be constructed using steel piles driven into the ground. The solar facilities will be constructed in blocks, and multiple blocks could be constructed simultaneously. Construction of the blocks will include pre-positioning and driving piles, mounting the tracking rack system to the piles, pre-positioning of panel pallets, mounting panels to the tracking rack system, the completion of electrical connections, terminations and grounding, and installation of cable management systems. In some situations where soils are low strength or consist of loose, non-cohesive sand or in areas with shallow bedrock, helical screw or auger-type foundation posts may be used. Foundations are typically galvanized steel and used where high load bearing capacities are required. The pile is driven using a hydraulic ram that moves along tracks and is operated by two workers. Soil disturbance would be restricted to the hydraulic ram/screw machinery, about the size of a small tractor, temporarily disturbing soil at each pile insertion location and while driving between drilling locations.

The remainder of the tracking rack system will be installed by construction crews using hand tools and all-terrain tracked equipment to distribute materials. Array racking will be bolted on top of the foundation piling to create a "rack" to which the solar panels can be fastened.

During array and racking assembly, multiple crews and various types of vehicles will be working within the Project. To the extent practicable, vehicular traffic will be limited to permanent and temporary access roads; however vehicular traffic will occur off of access roads throughout the Project during construction. These vehicles include flatbed trucks for transporting array components, small all-terrain vehicles, rough-terrain forklifts and skid-steers, as well as pick-up trucks for transporting equipment and workers. Panels will be staged in advance throughout the Project and brought to specific work areas for installation by wagon-type trailers pulled by small tractors or by all-terrain tracked equipment. The solar panels will be installed by multiple crews using hand tools. Installation crews will proceed in serpentine fashion along staked temporary access roads in a pre-established route to minimize off-road traffic.

4.5.1.6 Electrical Collection System

Electrical wiring will connect the panels to inverters, which will convert the power from DC to AC. The AC will be stepped up through a transformer from the inverter output voltage to 34.5 kV and brought via the collection cables to the Project substation. These cables may be installed in a hybrid above-ground/below-ground or below-ground system. See Section 4.2.2 for more information on each collection system type and installation.

4.5.1.7 Project Substation Construction

Construction work within the substation site will include site preparation and installation of substructures and electrical equipment. Installation of concrete foundations and embedments for equipment will require the use of trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. Above-ground and below ground conduits from this equipment will run to a control enclosure that will house the protection, control, and automation relay panels. A station service transformer will be installed for primary AC power requirements. Batteries and battery chargers will be installed inside the enclosure for auxiliary power to the

switchyard's control system. Crushed rock will cover the area of the substation and adequate lighting will be installed around the substation for worker safety during construction and operation.

One of two methods will be used to install substation foundations. Option 1 would be to use a small rubber tire backhoe to dig out major foundations prior to pouring the concrete slabs. Option 2 would use an auger/drill type machine for minor foundations.

In both scenarios, the limit of disturbance will be within the footprint of the substation for both the foundation equipment and the concrete delivery trucks. All topsoil from the substation footprint will be removed to a pre-established suitable location for storage. The storage area would be near the site where the soil was removed, accurately located (GPS boundary, soil depth) and graded to facilitate revegetation. Subsoil would be removed, if necessary, to an acceptable preestablished and approved area for storage. After decommissioning, subsoil will be returned to the area from which it was excavated (as needed), topsoil will be replaced, and the area will be brought back to pre-construction contours.

4.5.2 Construction Management

Wild Springs will designate an on-site construction manager. This manager's responsibilities include scheduling and coordinating the activities of engineering, procurement and construction contractors. The construction manager will be supported by other members of Wild Springs's team who specialize in engineering, permitting, meteorology, environmental compliance, real estate and Geographic Information Systems (GIS) mapping.

Throughout the construction phase, ongoing coordination occurs among the Project's development, design, and construction teams. The construction manager coordinates execution of the work. This coordination includes safety and quality control programs, cost and schedule forecasting, as well as site security and ongoing communication with local officials, citizen groups, and landowners.

4.5.3 Commissioning

During and upon completion of the construction phase, the Project will undergo inspection, testing and commissioning. Inspection and testing will occur for each component of the solar array, as well as the associated communication, meteorological, collection, and SCADA systems.

4.5.4 Restoration

Following construction, areas that will not contain permanent facilities (area under the arrays and the laydown yards that will not be converted into permanent parking for operations) will be stabilized with sediment stabilization and erosion control measures such as silt fence and biologs and re-vegetated according to the VMP (Appendix C). The site will be seeded with site specific seed mixes developed in coordination with the South Dakota U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and includes a seed mix specific to clay and loam soils and plant species that are adapted to the semi-arid climate (Appendix A – Agency Correspondence).

The VMP outlines two vegetation maintenance strategies that may be implemented at the Project: mowing and grazing. Mowing would take the form of traditional mowing once vegetation reaches a height of 18-24 inches during the growing season. Alternatively, Wild Springs may decide to use grazing with sheep as a long-term vegetation management technique. Grazing solar facilities with livestock is a developing management approach that Wild Springs is considering for this Project.

Wild Springs includes three seed mixes in the VMP: a rangeland mix, a grazing mix, and a wet mix. The rangeland mix reflects a management strategy of traditional mowing, and the grazing mix reflects a management method of utilizing sheep as grazers. The wet mix would be incorporated into either management style.

The rangeland mix is substantially similar to the existing vegetation currently in the non-cropped areas of the Land Control Area. This mix has many of the same plant species observed during field studies. The main difference between the mowing and grazing mixes is that the grazers will eat all the legumes first, so legumes are cut from the grazing mix and replaced with other species. The grazing mix is comprised of low-growing forbs that meet the nutritional requirements of a local sheep flock. The wet mix would be incorporated into areas around wetlands and drainages and will help stabilize soils after rain events. Additionally, a cover crop will be planted with the native mixes to stabilize the soil and prevent erosion during the time it takes for the native seeds to establish.

The VMP provides a guide to site preparation, installation of prescribed seed mixes, management of invasive species and noxious weeds, and control of erosion/sedimentation. The required restoration management is designed to continue for three years. The VMP outlines vegetation management tasks during the establishment and perpetual maintenance phases including monitoring for and treating any invasive species, mowing, and re-seeding. Additionally, vegetation community establishment targets are defined for each of the first three years of implementation of the VMP.

4.6 Project Operation and Maintenance

Following commissioning and commercial operation, the care, custody, and control of the facility transfers from the construction team to the operations staff. The construction manager works with the operations staff, the equipment suppliers, and other construction and maintenance personnel to ensure a smooth transition from the start of construction to the commercial operation date of the Project. The operations staff will have full responsibility for the facility to ensure operations and maintenance are conducted in compliance with approved permits, prudent industry practice and the equipment manufacturer’s recommendations.

The Project will be maintained and operated by Wild Springs, an affiliate, or contractor. Primary tasks include scheduled annual inspection(s) of electrical equipment, vegetation management as well as snow removal on access drives.

The expected service life of the Project is 20 to 30 years, and Wild Springs estimates that the Project will result in up to four full-time permanent positions to operate and maintain the Project facilities. A maintenance plan will be created for the Project to ensure the performance of the solar facilities, including a scheduled check of the main items and a predictive maintenance approach

of the devices subjected to derating/degradation. Derating/degradation refers to the known process of components losing some efficiency or otherwise degrading over the course of the Project's life cycle; like all technology and physical components, a certain amount of this is unavoidable, and Wild Springs will plan for it and maintain the facility as needed.

Once construction is complete, the solar facility will see one to two trucks on site daily, and at intervals associated with the maintenance schedule in Section 4.6.5 during normal operations. The main scheduled activities are described in more detail below in Sections 4.6.2 through 4.6.5.

All maintenance activities will be performed by qualified personnel. Maintenance activities will be performed during the day to the extent that they do not disrupt energy production. As an example, if a panel needs repair, that particular section of the array can be disconnected from the array by opening the combiner box circuit. The panel can then be replaced, and the combiner box circuit closed. Additionally, the power production circuits are separated from the tracking circuits. This allows the PV panels to operate during an unscheduled outage of the tracker system. Upon occasion, it may be desirable to perform maintenance when the sun is down. Activities that have the potential for substantial noise generation will be performed during the day to minimize impacts in areas where residents are present.

There will be an area for the storage of the spare parts and the tools as described in Section 4.2.2.2. The generating facility will be operated through a real-time control system for most operations functions.

4.6.1 Supervisory Control and Data Acquisition System

The solar arrays will communicate directly with the SCADA system for remote performance monitoring, energy reporting and troubleshooting. The SCADA system provides data on solar generation and production, availability, meteorology, and communications. The SCADA system allows monitoring of, and communications with, the Project and relays alarms and communication errors. All the monitored data will be managed by Wild Springs on-site in addition to a qualified subcontractor that will remotely monitor the site 24 hours a day, 7 days a week through the SCADA system.

4.6.2 Equipment Inspection

Inspection of the main equipment will occur at regular intervals, including the following:

- PV panels: visual check of the panels, tracking system and surrounding grounds to verify the integrity of the panels and tracking structure, the presence of animals and nests, etc. If a nest is identified, Project personnel will ensure the nest is not located such that it compromises electrical wiring or other components.
- Inverters, transformer and electrical panels: visual check of the devices including the connection cabinet and the grounding network. Check for presence of water and dust.
- Electrical check: measurement of the insulation level and dispersion. Check of the main switches and safety devices (fuses).
- Noise: check of abnormal sounds.

- Cabling and wiring: visual check of the buried and aerial electrical line and connection box to verify their status.

Wild Springs notes that panels are made of tempered glass, similar to that of a windshield. As such, the panels will not shatter, should a weather event such as hail occur at the Project site. Additionally, the anti-reflective coating on most panels, such as the panels being considered for the Project, does not contain contaminants. Furthermore, the semi-conductor materials within the panels do not contain hazardous materials.

4.6.3 Performance Monitoring

Performance monitoring of the Project facilities will consist of a weekly or monthly download of the data acquired by the onsite meteorological stations (energy produced, alarms, faults, etc.).

4.6.4 Facility Maintenance

Housekeeping of the Project facilities will include road maintenance, vegetation maintenance (method is to be determined; either traditional mowing or sheep and/or lamb grazers will be utilized), fence and gate inspection, lighting system checks, and PV panel washing (if required; minimal to no washing is anticipated to be needed at Project facilities due to the naturally occurring precipitation).

4.6.5 Maintenance Schedule

Table 4.6-1 provides more information on the anticipated frequency of the operations and maintenance tasks associated with the Project. The table represents the anticipated preliminary frequency of these tasks; the frequency of inspection may be varied based on facility demands and experience with performance of certain components and Project features.

Table 4.6-1 Operations and Maintenance Tasks and Frequency

Plant Device	Task	Preliminary Frequency
Photovoltaic (PV) Field	PV Panels visual check	Once Yearly
	Wirings and junction boxes visual check	Once Yearly
	PV strings measurement of the insulation	Once Yearly
	PV strings and string boxes faults	Once Yearly
	PV panels washing	No regular washing planned (only as site-specific conditions warrant)
	Vegetation Management (if necessary at site)	Once Yearly
Electric Boards	Case visual check	Once Yearly
	Fuses check	Once Yearly
	Surge arresters check	Once Yearly
	Torque check	Once Yearly

Table 4.6-1 Operations and Maintenance Tasks and Frequency		
Plant Device	**Task**	**Preliminary Frequency**
	DC voltage and current check	Once Yearly
	Grounding check	Once Yearly
Inverter	Case visual inspection	Once Yearly
	Air intake and filters inspections	Once Yearly
	Conversion stop for lack of voltage	Once yearly
	AC voltage and current check	Once yearly
	Conversion efficiency inspection	Once yearly
	Datalogger memory download	Once yearly
	Fuses check	Once yearly
	Grounding check	Once yearly
	Torque check	Once yearly
Support Structures	Visual check	Once yearly
	PV panels toque check on random sample	Once yearly
Project Substation	Visual Inspection	Once monthly

4.6.6 Operations and Maintenance Building

As described above, the O&M building may be located adjacent to the Project substation. The O&M building will allow maintenance staff to conduct on-site diagnostics, repairs, predictive maintenance, and preventive maintenance activities. This facility will also serve as an office space for the on-site Plant Manager and a warehouse for critical spare parts outlined in Section 4.2.2.2.

A Spill Prevention, Control, and Countermeasures Plan (SPCC Plan) is required by the Environmental Protection Agency (EPA) if any facility associated with the Project (O&M building or substation) has oil storage of more than 1,320 gallons. The Project substation will contain a single, industry-standard main power transformer, which will require a SPCC Plan. Other onsite storage at the O&M building may include hydraulic oil stored in a plastic or poly tote or 55-gallon drums on secondary containment pallets and potentially a fuel tank, for maintenance vehicles, that would be a double walled tank with additional secondary containment. Additionally, the Project's Stormwater Pollution Prevention Plan (SWPPP) will describe pollution prevention measures for storage, handling and disposal of hazardous materials, solid waste, concrete and equipment wash water, portable toilets, construction products and materials.

5.0 DECOMMISSIONING OF ENERGY FACILITIES (ARSD 20:10:22:33)

At the end of the Project's useful life, Wild Springs will either take necessary steps to continue operation of the Project (such as re-permitting and retrofitting) or will decommission the Project and remove facilities. In accordance with Section 317-A-15 of the Pennington County Zoning Ordinance (July 10, 2019), decommissioning activities will include:

- Dismantling and removing all Project-related equipment, foundations, and ancillary equipment to a depth of forty-two (42) inches below grade. Any soil disturbance associated with decommissioning would include topsoil segregation.
- Removing the operation and maintenance facility and access roads, unless the landowners request in writing that all or any portion of the facility and/or access roads remain in place. Access road restoration will include removal of surface road material and restoration of the roads to substantially the same physical condition that existed immediately before construction of the Project.
- Restoration of the Project site, including: decompaction; revegetation (in accordance with NRCS guidance or landowner request); and to the extent possible, reclamation to the approximate original topography and original or better topsoil quality that existed immediately prior to construction of the Project.
- Executing agreements, as needed addressing the Project's use, improvement, and post-decommissioning restoration and repair of existing, maintained roads, including any associated road restoration and repair costs.
- Standard decommissioning practices would be utilized, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements.

Wild Springs anticipates no land will be irretrievably committed after decommissioning; that is, unless the landowners request in writing that all or any portion of the facility and/or access roads remain in place, all land will be restored to pre-construction conditions to the extent possible.

5.1 Anticipated Life of the Project

The anticipated Project life is approximately 20 to 30 years beyond the date of first commercial operation.

5.2 Timeline

In accordance with Section 317-A-15 of the Pennington County Zoning Ordinance, decommissioning of the Project would begin within eight months after the Project reaches the end of its useful life and would be completed within eighteen months after the Project reaches the end of its useful life, unless the Pennington County Planning Commission approves a different schedule. Pursuant to Section 317-A-15(b) of the Pennington County Zoning Ordinance, a Utility-scale Solar Energy Systems (USES) would be presumed to be at the end of its useful life if it did not generate any electricity for a continuous 12-month period; however, the presumption may be rebutted by submitting to the Planning Commission for approval a plan to return the project to service within 12 months of submission. Decommissioning is estimated to take six to ten months

to complete and the decommissioning crew will ensure that all equipment is recycled or disposed of properly.

5.3 Cost to Decommission

A Decommissioning Plan for the Project, including a decommissioning cost estimate prepared by Westwood Engineering (a South Dakota-licensed engineering firm), is provided in Appendix D. As set forth in the Decommissioning Plan, based on current recycling costs and salvage values, the cost of decommissioning the Project is estimated to be approximately $2,323,000.00. Wild Springs will be responsible for all costs to decommission the Project and associated facilities.

In accordance with Section 317-A-15(f) of the Pennington County Zoning Ordinance, Wild Springs must provide a certificate of insurance and financial assurance to the Planning Department prior to the start of construction of the Project. Since decommissioning financial assurance is already required by Pennington County, Wild Springs requests that the Commission defer to the decommissioning financial assurance requirements set forth in Section 315-A-15 of the Pennington County Zoning Ordinance. However, to ensure the Commission has the ability to access the decommissioning financial assurance that will be provided, Wild Springs proposes naming both Pennington County and the Commission as beneficiaries of the decommissioning financial assurance instrument. Also, to account for potential changes in decommissioning costs, Wild Springs proposes that an updated decommissioning cost estimate be provided to Pennington County and the Commission at year 10 of operation, which would be used to update, as needed, the decommissioning cost financial security.

5.4 Removal and Disposal of Project Components

The removal and disposal details of the Project components are found below:

- **Panels:** Panels inspected for physical damage, tested for functionality, and removed from racking. Functioning panels packed and stored for reuse (functioning panels may produce power for another 25 years or more). Non-functioning panels packaged and sent to the manufacturer or a third party for recycling or another appropriate disposal method.
- **Racking:** Racking uninstalled, sorted, and sent to metal recycling facility.
- **Steel Pier Foundations:** Steel piles removed and sent to a recycling facility.
- **Wire:** belowground wire abandoned in place at depths greater than four feet. Wire above four feet removed and packaged for recycling or disposal.
- **Conduit:** Above-ground conduit disassembled onsite and sent to recycling facility.
- **Junction boxes, combiner boxes, external disconnect boxes, etc.:** Sent to electronics recycler.
- **Inverter/Transformer:** Evaluate remaining operation life and resell or send to manufacturer and/or electronics recycler.
- **Concrete pad(s):** Sent to concrete recycler.
- **Fence:** Fence will be sent to metal recycling facility.
- **Computers, monitors, hard drives, and other components:** Sent to electronics recycler. Functioning parts can be reused.

Recycling of solar panels and equipment is rapidly evolving and can be handled through a combination of sources such as certain manufacturers, PVCycle (an international program that some silicon manufacturers participate in) or waste management companies. More than 90 percent of the semiconductor material and glass can be reused in new modules and products.

5.5 Restoration/Reclamation of Facility Site

After all equipment is removed, the site will be restored so as to be able to return to the use that existed prior to construction of the Project. Holes created by steel pier foundations, fence poles, concrete pads, and other equipment, and re-claimed access road corridors will be filled in with subsoil; the site will be reclaimed approximately to the original topography that existed immediately prior to construction of the Project; topsoil (original or better quality) will be replaced; and the site will be seeded. Grading and other soil disturbance activities during decommissioning will be kept to the minimum necessary to effectively decommission the site to maintain the soil benefits realized during the long-term operation of the Project, which include, building topsoil through plant matter decay, carbon capture, and beneficial soil bacteria that are often absent from soil subject to row crop agriculture.

Wild Springs reserves the right to extend operations instead of decommissioning. In this case, a decision may be made on whether to continue operation with existing equipment or to retrofit the facilities with upgrades based on newer technologies.

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

The anticipated schedule for development, construction, testing, and commercial operation is outlined below:

- **Land acquisition**: Complete. Wild Springs has lease agreements for the Project site. Land that is under lease but is not needed by the Project can continue to be used by the landowner for agricultural purposes and these areas may also be released from the leased area.
- **Facility Permit:** Wild Springs anticipates the Facility Permit will be issued in the first quarter of 2021.
- **Other Permits:** Wild Springs will acquire all other permits necessary for construction of the Project prior to conducting the work for which the permit is required. Refer to Section 11.1 - Permits and Approvals.
- **Environmental Studies:** Wild Springs will conduct a baseline breeding bird survey in May and June 2020, followed by post-construction breeding bird surveys in years two and four of Project operation.
- **Equipment Acquisition:** Wild Springs is in the process of evaluating and procuring solar equipment for the Project facilities. The equipment will be allocated to the Project after meteorological and economic studies are completed to achieve the best match of technology for the facility location.
- **Construction:** Wild Springs anticipates that construction will take as many as twelve months beginning as early as fall of 2021 and will be completed by the end of 2022. Section 4.5 of this Application provides additional information on the construction process.
- **Commercial Testing:** Testing for the Project is expected to begin as early as the third quarter 2021, following the completion of construction.
- **Commercial Operations:** Commercial operation for the Project is scheduled to begin by the end of 2022, following the completion of construction and testing.

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

Wild Springs considered Pennington County for a solar project based on the high solar resource in this portion of the state (Image 7 – Direct Normal Solar Resource of South Dakota; NREL, 2017), transmission capacity at the New Underwood Substation, and landowners willing to host a solar facility on their land. Wild Springs initially evaluated the area of the proposed Project site and another location a few miles south. The area around the proposed Project site was selected over the southern area because the latter would have required a longer generation tie line to interconnect to the New Underwood Substation, with associated increased land requirements and costs. With respect to the area around the proposed Project site, as discussed further below, Wild Springs initially contacted landowners within approximately five miles of the New Underwood Substation and selected the current Project site based four key factors: (1) landowner interest; (2) securing contiguous parcels; (2) proximity to the New Underwood Substation (i.e., adjacency); and (4) sufficient development area to allow construction and operation of a 128 MW solar facility. Further, as a result of site-specific studies, the Project site was adjusted to avoid or minimize impacts to certain environmental features.

The following sections describe further the criteria that were considered in determining the development potential of the site, as well as how the site was expanded and contracted to accommodate development, while avoiding or minimizing impacts to resources with Project design.

7.1 Selection of the Land Control Area

The exceptional solar resource, transmission interconnect availability, and supportive local community were foundational to the Project's conception. Wild Springs identified the area around the New Underwood Substation as a potential development area because of the substation's available capacity to interconnect the Project to the transmission system, a general lack of environmental constraints, the presence of adequate roads for access to the site, and the relatively flat unobstructed terrain needed to maximize utilization of the solar resource. Wild Springs then met with landowners within approximately five miles of the New Underwood Substation to gauge whether there was enough interest from relatively contiguous landowners in voluntarily participating in the Project. This distance was selected to account for transmission interconnect efficiency, which is essential to successful Project development. Siting the Project in proximity to an existing substation allows Wild Springs to make efficient use of existing equipment, minimize line loss and avoid the need for large transmission line construction. Wild Springs ultimately signed lease agreements with landowners that owned relatively flat, unobstructed, generally contiguous parcels of land, with limited environmental constraints, that are directly adjacent to the New Underwood Substation and were willing to host Project facilities. Use of these criteria reduced the need for new transmission infrastructure to a line that will be less than one mile in length.

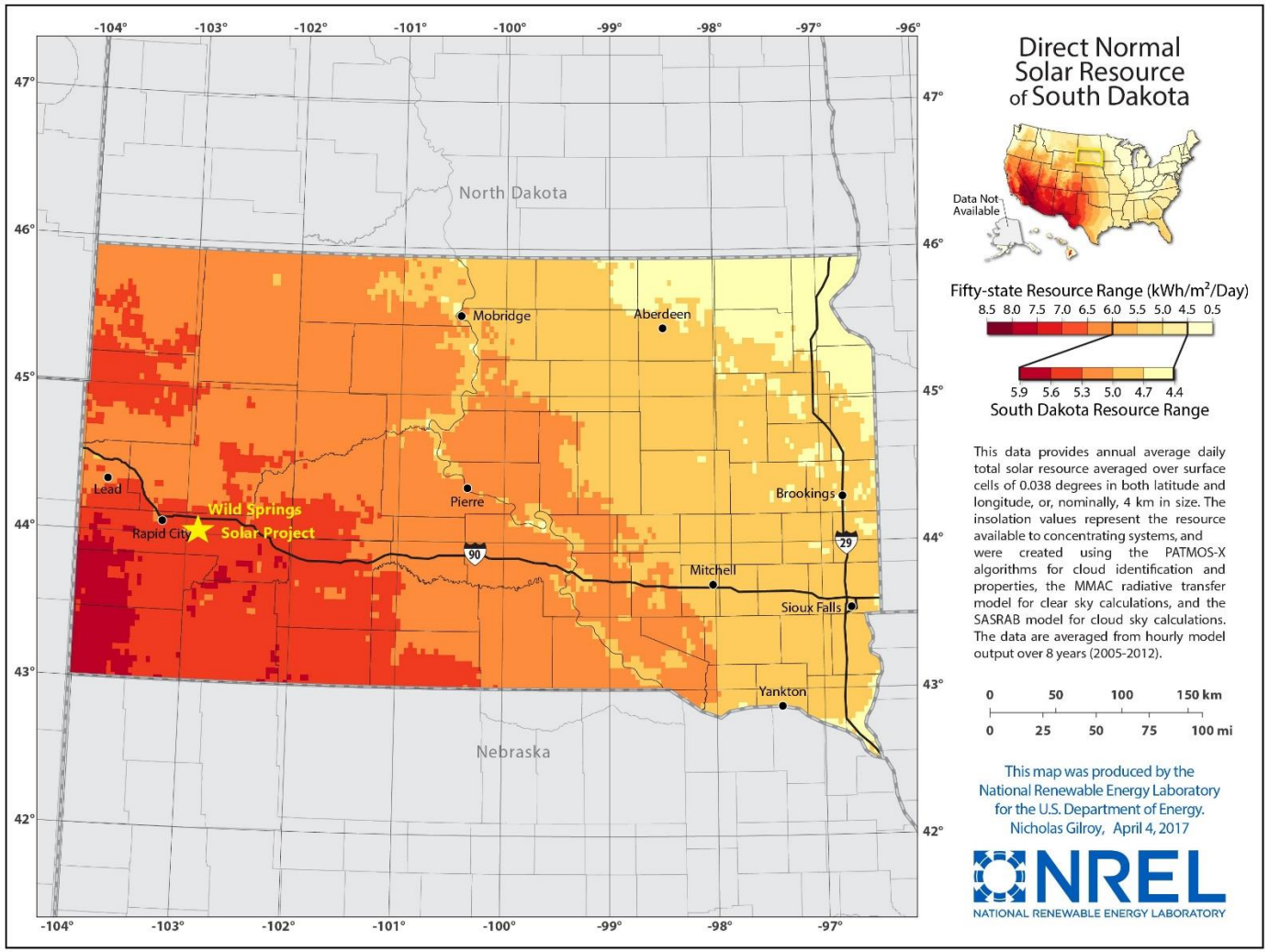
Wild Springs began executing lease agreements with landowners in 2016 and met with Pennington County in July 2017 to discuss the Project. Between 2017 and 2019, Wild Springs initiated initial environmental surveys, transmission interconnection studies and marketed the Project to potential

power purchasers. After Basin Electric became interested in the Project in 2019, development of the Project, including environmental surveys, accelerated.

7.1.1 Lack of Reliance on Eminent Domain Powers (ARSD 20:10:22:12(3))

Wild Springs did not use eminent domain powers to acquire easements for the Project. All land rights required for the solar energy facility were obtained through voluntary leases with property owners. Private land and public road rights-of-way would be used for all facilities. Further, Wild Springs will coordinate with federal, state, and local agencies to obtain appropriate permits for the Project. Thus, selection of an alternative site would not reduce reliance on eminent domain powers.

Image 7 Direct Normal Solar Resource of South Dakota



Source: NREL, 2017

7.2 Environmental Site Surveys and Resulting Site Adjustments

Wild Springs initiated consultation with the U.S. Fish and Wildlife Service (USFWS) and the South Dakota Department of Game, Fish, and Parks (SDGFP) in June 2017 to introduce the proposed Project and to request information on habitats and species of concern. Since that time, Wild Springs has conducted several field surveys for wildlife and other environmental resources, including wetlands and waterbodies and cultural resources, and has used this site-specific data to help shape the Land Control Area:

- The initial 1,000-acre Land Control Area (2017) was surveyed for prairie grouse leks, wetlands and waterbodies, cultural resources, and incidental wildlife observations. Based on results of this field effort, Wild Springs increased the Land Control Area to 1,265 acres to allow sufficient development area, while avoiding a cultural resource site and minimizing impacts to wetlands and waterbodies. This revised Land Control Area eliminated approximately 145 acres from the initial 1,000-acre Land Control Area due to cultural resources and forested area associated with Boxelder Creek and expanded to the south. Wild Springs added acreage to the south in part due to parcels in this area being owned by landowners in the original 1,000-acre Land Control Area, but also because development to the north was not feasible due to the railroad and Boxelder Creek, development to the east of the 1,000-acre Land Control Area and north of the New Underwood Substation was not preferred due to several residences and topography, and development to the west further from the New Underwood Substation could impact design.
- The 1,265-acre September 2019 Land Control Area was further surveyed for environmental resources. Two likely associated black-tailed prairie dog colonies totaling approximately 52 acres were identified in the southern portion of the 2019 Land Control Area. While black-tailed prairie dog colonies are not protected by federal or state law, they can provide habitat for some federal and state-listed species such as black-footed ferret (federal and state listed endangered) and state-listed burrowing owl and swift fox. To facilitate avoidance of these mapped colonies, Wild Springs further expanded the Land Control Area to the south and southeast, increasing the total Land Control Area acreage to 1,499. While the 2019 mapped prairie dog colonies remain within the Land Control Area, they are avoided in the Project design. In evaluating the need for additional acreage, Wild Springs considered the constraints described above for the initial expansion between 2017 and September 2019. Additional acreage was added east of the New Underwood Substation due to the landowner's existing involvement in the Project, relatively flat terrain, and proximity to the substation.
- Field surveys for cultural resources, wetlands and waterbodies, and incidental wildlife observations were completed in the previously unsurveyed portions of the 1,499-acre Land Control Area in November 2019.

Figure 6 (Land Control Area Refinement) displays the chronology of the Land Control Area adjustments and Wild Springs' efforts to avoid and minimize impacts to environmental resources. Throughout the siting process, Wild Springs evaluated environmental resources over 1,643 acres, of which, 1,499 are in the proposed Land Control Area. More information on field surveys and agency coordination is presented in Chapter 9 below.

7.3 Land Control Area and Design Considerations

The Project presented in this Application represents Wild Springs' efforts to avoid and minimize impacts to environmentally sensitive resources such as cultural resources, federal- and state-listed species potential habitat, and wetland and waterbody complexes. While these resources are present within the Land Control Area, Wild Springs used the field survey data collected to modify the Project design to exclude the archaeological site and the 2019-mapped extent of the prairie dog colonies; that is, these features are outside the proposed perimeter fencing surrounding the Project facilities. Additionally, the current design excludes 22 wetlands and waterbodies, and only five wetlands are within the perimeter fence; these wetlands will not be impacted by any Project facilities (i.e., access roads, solar arrays, inverters, and laydown areas).

8.0 LOCAL LAND USE CONTROLS (ARSD 20:10:22:18, 20:10:22:19)

Per the Pennington County Zoning Ordinance, a solar energy facility located in the Agricultural Zoning District must obtain a Conditional Use Permit (CUP). Chapter 317 of the Pennington County Zoning Ordinance, Alternative Energy Systems, outlines a number of general provisions for USES including but not limited to: zoning district, lot size, setbacks, safety/access, height, fire safety, signage, noise, appearance, lighting, utility notification, fencing, and mitigation measures. Wild Springs will comply with all provisions and setback requirements. Table 8-1 outlines the county requirements and the proposed setbacks incorporated into the design of the Wild Springs Solar Project. Appendix B – Site Plan displays the Project's design and setbacks.

Table 8-1 Utility-Scale Solar Energy System Setback Requirements

Utility-Scale Solar Energy System Setback Requirement	Requirements	Proposed Setbacks
Pennington County		
204 – H Section Lines	Minimum of 58 feet (33 feet for statutory right-of-way plus public road setback)	63 feet
317-A-7-c Public road rights-of-way	25 feet or 1.5 times the height of the structure, whichever is greater	30 feet
317-A-7-c Any property line	25 feet or 1.5 times the height of the structure, whichever is greater[1]	30 feet
317-A-7-c-1 Residentially zoned lots and existing residences[2]	100 feet	147 feet
317-A-7-h Noise requirement	Noise standard of 55 A-weighted decibels (dBA) at the closest property line	Wild Springs will site panels and inverters at the distance required to meet the 55-dBA standard (at least 143 feet for inverters and at least 10 feet from arrays)

The Project is predominately sited in an area zoned as "general agriculture"; 35 acres of the Land Control Area fall within an area zoned as "limited agriculture" (see Figure 7 – Pennington County Zoning). During a February 2020 meeting with Pennington County, Wild Springs confirmed USES are conditional uses in both zoning districts. Wild Springs will submit a CUP application to Pennington County for the Project in the second quarter of 2020.

[1] Wild Springs will obtain a Variance from Pennington County for participating parcels.

[2] No residentially zoned lots are located within 100 feet of the Land Control Area.

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

The following sections provide a description of the existing environment at the time of the Application submittal, potential impacts to the existing environment as a result of the construction and operation of the Project, and the mitigation measures that Wild Springs would implement to avoid or minimize these impacts.

For existing conditions within the portions of land under Wild Springs' control, calculations are based on the Land Control Area (1,498.6 acres). This reflects the fact that final design may necessitate development anywhere within the overall area Land Control Area. Additionally, for any discussions of resources that are located outside of the facility (such as parks within one mile), the Land Control Area boundary is used to discuss the Project's proximity to these features.

For approximating areas of potential impact, the Preliminary Development Area is used (approximately 1,108.1 acres); this reflects the possibility for resources to be impacted within the area that preliminary design indicates is needed for construction and operation of the facility. In some instances, Wild Springs separates the Preliminary Development Area acreage into two categories: impervious surfaces (i.e., the substation and O&M building, inverter skids, parking areas, and access roads; 47.3 acres or 4 percent of the Preliminary Development Area) and areas that will be revegetated with a rangeland mix (the area within the security fence less the impervious surfaces; 1,060.8 acres or 96 percent of the Preliminary Development Area).

ARSD 20:10:22:13 requires that, "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 of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction".

Based on data from the U.S. Energy Information Administration, the closest energy conversion facilities are located within Rapid City (EIA,2020). There are two natural gas power plants totaling 150 MW on the west side of Rapid City. Because these power plants are more than 20 miles from the Project, no cumulative impacts are anticipated. Therefore, cumulative effects are not discussed in this Application.

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

9.1.1 Geological Resources

9.1.1.1 Existing Geological Resources

Regional Landforms/Physiography

The Project lies within the Great Plains province, the second largest of the physiographic provinces in the United States (NPS, 2017). The province extends south from the Canadian border to the Mexican border and from the boundary of the Central Lowlands province in the western half of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas to the boundary of the Rocky Mountains covering the eastern half of Montana, Wyoming, Colorado, and New Mexico. In South Dakota, the Great Plains province is further subdivided into the Missouri Plateau

(glaciated), Missouri Plateau (unglaciated), and the Black Hills divisions (Fenneman, 1916). The Project is situated within the western margin of the Missouri Plateau (unglaciated) division, where the topography is characterized by buttes and canyons with wide stretches of hilly uplands bounded by streams (Rothrock, 1943).

Surficial Geology

The surficial geology in the Land Control Area consists of alluvial deposits primarily located along the margins of Boxelder Creek and other smaller tributaries in the area (Martin et al., 2004). Alluvial deposits consist of clay- to boulder-sized clasts with locally abundant organic material, that generally continue to a depth of 75 feet. Based on South Dakota Department of Environment and Natural Resources (SDDENR) water rights well completion reports within half mile of the Land Control Area, well logs for water wells drilled between 1962 and 2005 indicate surficial deposits range from three to sixteen feet before encountering shale (i.e., bedrock; SDDENR, undated). Figure 8 displays the surficial geology, economic deposits, and water rights well completion reports in the Land Control Area and immediate vicinity.

Bedrock Geology

Upper Cretaceous-age Pierre Shale is the first bedrock encountered beneath the surficial geology deposits within Pennington County and the Land Control Area. 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. This bedrock contains minor sandstone, conglomerate, and abundance carbonate and ferruginous concretions. It extends to a maximum thickness of 2,700 feet (Martin, et al., 2004). A cross section depicting the bedrock and surficial geology in the Land Control Area are shown on Figure 9 – Bedrock and Surficial Geology Cross Section.

Mineral Resources/Economic Deposits

Based on information from the SDDENR Minerals and Mining Program and a review of United States Geological Survey (USGS) 7.5-minute quadrangle mapping, there are no sand, gravel, and construction aggregate mining resources in the Land Control Area. The closest active mine is approximately 1.25 miles northeast of the Land Control Area and immediately adjacent to the New Underwood Dam, north of Interstate 90 (Figure 8 – Surficial Geology, Economic Deposits, and Water Rights Well Completion Reports). While the Black Hills region of South Dakota, west of the Project, has a history of gold mining, the Land Control Area lies outside of the Black Hills Precambrian deposits where gold deposits were found; therefore, the Project would not affect gold mining.

A review of the online information from the SDDENR Oil and Gas Initiative Program GIS website reveals that the Land Control Area does not lie within an oil and gas field; the nearest identified oil and gas field is the Gullickson field located in northwest Meade County, South Dakota, approximately 40 miles due northwest of the Land Control Area (SDDENR, Undated). Additionally, there are no records of oil and gas permits or wells within the Land Control Area; a well was permitted, plugged, and abandoned in 1957 approximately three quarters of a mile southeast of the Land Control Area (SDDENR, Undated; Figure 8 – Surficial Geology, Economic

Deposits, and Water Rights Well Completion Reports). No other active or historic economic mineral deposits have been identified within the vicinity of the Project.

Seismic Risks

The risk of seismic activity in the vicinity of the Land Control Area is low. According to the USGS 2018 National Seismic Hazard Model, the Peak horizontal acceleration with a 2 percent probability of exceedance in 50 years is 0.02 g to 0.04 g ("g" are units of acceleration due to gravity) (Rukstales and Petersen, 2015).

According to the South Dakota Geologic Survey (SDGS), seven earthquakes have been recorded in Pennington County between 1872 to 2013 (SDGS, 2013). The intensity of the earthquakes ranged from a magnitude 2.5 earthquake in 2004 to a magnitude 4.4 earthquake in 1964. The most recent earthquake in Pennington County was a 3.1 magnitude earthquake in 2007. 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, 2016).

Subsidence Potential

The potential for subsidence within the Land Control Area is negligible. The Pierre Shale bedrock is buried beneath a layer of alluvial deposits across most of the Project vicinity that ranges from three to sixteen feet and up to 75 feet (Martin et al., 2004; SDDENR, undated). 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 et al., 1980). Wild Springs is not aware of any documented historic underground mining operations within the Project vicinity, which could indicate a potential subsidence risk.

9.1.1.2 Impacts to Geological Resources

Impacts of the proposed Project to available geologic resources are likely to be limited. The average depth to bedrock within the vicinity of the Land Control Area ranges from three to sixteen feet (see Section 9.1.1.1); there may be some locations where Wild Springs encounters bedrock when installing the tracking rack system piers, which will be installed at eight to fifteen feet below the surface, or while installing the collection and communication systems which will be installed at an average depth of four feet. Because the depth to bedrock may be shallow in some portions of the Land Control Area, some collection lines may have to be buried less than four feet from the ground surface. However, if a hybrid collection system is selected for the Project, the DC collection lines connecting the panels to the inverters would be above-ground, thereby significantly reducing the amount of collection cable to be trenched.

Wild Springs does not anticipate operational impacts to bedrock or surface geology. Additionally, due to the limited potential for large, seismically induced ground movements, there is minimal risk of earthquake-related impacts on the Project.

9.1.1.3 Mitigation Measures for Geological Resources

Wild Springs will conduct geotechnical borings within the Land Control Area prior to construction. This effort will gather site-specific depth to bedrock within all portions of the

developed area and inform final engineering and construability. If the depth to bedrock is less than the up to 15 feet required for traditionally installing the steel pier tracking rack system, Wild Springs will utilize alternative engineering solutions such as helical screws.

No sand, gravel, or gold mining operations exist within the Land Control Area; therefore, the Project will not impact sand, gravel, or gold mining operations.

Geologic hazards, such as seismicity, are considered to be extremely low to negligible in the Land Control Area. Due to 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 would be required.

9.1.2 Soil Resources

9.1.2.1 Existing Soil Resources

Soil characteristics within the Land Control Area were assessed using the Soil Survey Geographic Database (SSURGO) (Soil Survey Staff, NRCS, U.S. Department of Agriculture [USDA], 2020). The SSURGO database is a digital version of the original county soil surveys developed by 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 (Soil Survey Staff, NRCS, USDA, 2020).

Table 9.1-1 lists the soil types located within the Land Control Area, which are also displayed on Figure 10 – Soils (SSURGO).

Table 9.1-1 Soil Map Units within the Land Control Area

Map Unit Symbol	Map Unit Name	Acres in Land Control Area	Percent of Land Control Area
ArA	Arvada loam, 0 to 3 percent slopes	14.0	0.9
BfA	Beckton silt loam, 0 to 4 percent slopes	11.7	0.8
HpB	Hisle silt loam, 0 to 6 percent slopes	182.0	12.1
KyA	Kyle clay, 0 to 2 percent slopes	531.4	35.5
KyB	Kyle clay, 2 to 6 percent slopes	204.3	13.6
Lo	Lohmiller silty clay	22.7	1.5
NuA	Nunn loam, 0 to 2 percent slopes	98.2	6.5
NuB	Nunn loam, 2 to 6 percent slopes	97.2	6.5
PeB	Pierre clay, 2 to 6 percent slopes	235.7	15.7
PeC	Pierre clay, 6 to 9 percent slopes	10.9	0.7
PeD	Pierre clay, 6 to 20 percent slopes	3.6	0.2
SzB	Swanboy clay, 0 to 3 percent slopes	84.3	5.6
W	Water	2.6	0.2
	Totals	**1,498.6**	**100**

The Natural Resource Conservation Service (NRCS) Major Land Resource Areas (MLRAs) geographic database was used to generally characterize soil resources in the Land Control Area. MLRAs usually encompass several thousand acres and are characterized by a particular pattern of soils, geology, climate, water resources, and land uses (NRCS, 2006). The Project is located in the Pierre Shale Plains (60A) MLRA, within the Land Resource Region G - Western Great Plains Range and Irrigated Region. Soils in this MLRA, and in the Land Control Area specifically, are generally well drained and clayey.

9.1.2.2 Impacts to Soil Resources

Impacts to soils will occur during the construction and decommissioning stages of the Project. Construction may require some amount of grading to provide a level surface for the solar arrays. Because the Project location is on relatively level existing agricultural and rangeland fields, the Project will minimize grading to the extent practicable. Some grading will be required to provide a more level workspace and maintain soil stability in areas with a slope greater than five percent. Approximately 25 percent of the Land Control Area has a slope greater than five percent, however the areas that will be graded will be less, as grading activities will be limited to the developed area. Additionally, Wild Springs has avoided placing solar arrays within low-lying drainages that would require grading.

Additional soil impacts during construction will come from the installation of the direct-embedded piers that support the structural framework of the solar arrays, and small areas of foundations for the inverter skids, the Project Substation, and O&M building structures. Based on the electrical configuration, impacts to soils will differ. Should the below-ground collection configuration be used, installation of electrical cables will require trenching all of the cables to a depth of four feet below grade for installation. If the hybrid collection system is used, soil impacts due to trenching will be limited to the areas between the rows of panels to the inverter/transformer skids and then to the Project substation.

9.1.2.3 Mitigation Measures for Soil Resources

Areas of the site to be graded will have topsoil and organic matter stripped and segregated from the subsoil. Topsoil shall have temporary and permanent stabilization measures established in accordance with the Project's SWPPP. Internal roads will be constructed of inorganic fill (road aggregate base) to match the surrounding existing ground elevations to allow existing drainage patterns to persist. Once the necessary grading is complete, subsoil will be placed followed by topsoil, blending the grade into existing topography.

Following construction, Wild Springs will restore disturbed areas to pre-construction conditions to the extent practicable. Soil erosion will be minimized by implementing environmental protection measures. These measures will include BMPs for erosion and sediment control, such as temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. Compaction and rutting are potential impacts. Wild Springs will design construction access and manage construction passes to minimize the number of trips occurring in a given area and will implement wet weather procedures any time that rutting is observed. Deep compaction is not anticipated to be a significant problem as the number of construction equipment passes over a

given area is limited, and construction equipment consists of smaller, low-ground-pressure tracked vehicles.

Additionally, recent research on the environmental impacts of solar farms indicates that there could be some net benefits to soil resources over the lifecycle of the Project. Writing in Cleantechnica, one of the world's top cleantech-focused news sites, engineer Jeff Briberg highlights the utility and specific benefits of incorporating native plants on solar sites, especially in areas that were previously cultivated (Briberg, 2016 and Selbig and Balster, 2010).

> *"[Compared to row crops,] storm water runoff is reduced 23 percent for the 2-year storm (2.9 inches of rain) and 8 percent for the 100-year storm.*
>
> *Further, we expect a mix of prairie plants to provide superior hydrologic performance compared to monocrop turf-grasses that are common on solar sites in some areas of the country. In 2008, the U.S. Geological Survey completed a five-year storm water study in cooperation with a consortium of 19 cities and towns in the area of Madison, Wisconsin that revealed 'striking differences between turf and prairie vegetation.'*
>
> *The study found 'prairie vegetation had greater median infiltration rates than those with turf grass,' and roots in the prairie vegetation plot were 'found to a depth of 4.7 feet compared with 0.46 feet in the turf.'"*

In addition to superior stormwater management, native plants improve the soil with organic matter over the 20 to 30-year life the Project, allowing microorganisms and soil fauna to recover after years of intensive compaction, pesticide and fertilizer application. And, over time, native plants out-compete weeds allowing ground cover to be maintained with just a single annual mow, reducing operating costs.

With the proper implementation of environmental protection measures intended to prevent, minimize, and/or reclaim soil erosion effects, no unmitigated loss of soil will result from the Project. Additionally, taking 1,103.9 acres of cultivated cropland and herbaceous land out of production and grazing will give the soils an opportunity to rest and regenerate. Cultivated cropland within the fenced area of the solar facility (approximately 288.8 acres) will be converted to open, herbaceous (i.e., rangeland) cover with the exception of the inverters and access roads, which will be converted to developed land and impervious surfaces (7.9 acres). Seed mixes are discussed in more detail in Section 9.3.1.

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

9.2.1 Existing Hydrology

9.2.1.1 Hydrogeology Resources

The Land Control Area is located within the Northern Great Plains aquifer system. The aquifer system extends more than 300,000 square miles, underlying most of North Dakota and South Dakota, and parts of Montana and Wyoming. Five major aquifers comprise the permeable rocks

of the aquifer system, including: lower Tertiary, upper Cretaceous, lower Cretaceous, upper Paleozoic, and lower Paleozoic (USGS, 1996).

According to the USGS Ground-Water Resources in the Black Hills Area, South Dakota, the principal aquifers within the Land Control Area listed by depth are the Deadwood, Madison, Minnelusa, Minnekahta, and Inyan Kara aquifers (USGS, 2003). The Inyan Kara Aquifer is the shallowest of the five aquifers east of the Black Hills, has a thickness of 900 feet, an aerial extent of 2,512 square miles, and a storage of 84.7 million acre-feet of water. The Minnekahta Aquifer follows with thinner thickness of 65 feet, but has an aerial extent of 3,082 square miles, and a storage of 4.9 million acre-feet. The Minnelusa aquifer has a thickness of 1,175 feet, an aerial extent of 3,623 square miles, and a storage of 70.9 million acre-feet. The Madison has a thickness of 1,000 feet, an aerial extent of 4,113 square miles, and a storage of 62.7 million acre-feet. The Deadwood aquifer, the deepest of the five aquifers, has a thickness of 500 feet, an aerial extent of 4,216 square miles, and a storage of 30.5 million acre-feet. Recharge of all five aquifers is primarily from infiltration of precipitation and lateral inflow but the Minnekahta and Minnelusa aquifers receive a substantial amount of recharge from stream flow losses. The water quality is good in all aquifers with the only large difference being an abrupt increase in concentrations of dissolved sulfate in the Minnelusa aquifer farther from outcrops. Well depth to these aquifers is typically at least 40 feet but can reach depths up to several thousand feet (Northern State University, undated).

9.2.1.2 Watersheds

The Land Control Area is located within the Cheyenne River Basin. The Cheyenne River Basin consists of sub-region, basin, and sub-basin drainages (Hydrologic Unit Code [HUC] 4, 6, and 8 respectively). The Land Control Area is within the Cheyenne Sub-Region (HUC-4), Cheyenne Basin (HUC-6), and the Middle Cheyenne-Elk Sub-Basin (HUC-8) (USGS, 2020).

Topography of the Land Control Area within the Middle Cheyenne-Elk Sub-Basin (HUC-8 10120111) is undulating, containing several hills and saddles with elevations ranging from 2,840 to 3,020 feet.

9.2.1.3 Waterbodies

Wetlands are defined by USACE as a subset of waters of the U.S and are addressed in Section 9.2.1.4. Other waters of the U.S. include unvegetated waterways and other waterbodies with a defined bed and bank, such as tide channels, drainages, ponds, creeks, rivers, and lakes (Environmental Laboratory, 1987); these other waters of the U.S. are addressed in this section. The USACE has the authority to regulate the discharge of dredged and fill material into jurisdictional waters of the U.S. Impacts to waters of the U.S. are reviewed, permitted, and mitigated through the Clean Water Act (CWA) Section 404 permitting process.

The National Hydrography Dataset (NHD) represents U.S. drainage networks and related features, such as rivers, streams, canals, lakes, ponds, glaciers, coastlines, dams, and stream gauges (USGS, undated). A review of this dataset identified one NHD basin and seven intermittent waterbodies within the Land Control Area (Figure 11 – Waterbodies, Wetlands, and Floodplains).

Wild Springs conducted an analysis of drainage areas in the Project. Several upland swales and ephemeral draws dissect the Land Control Area, generally flowing to the north and east off-site towards Boxelder Creek. The results of this flow analysis are illustrated in Appendix E - Wild Springs Solar Flow Direction Map. The flow analysis in Appendix E considers both pre- and post-construction drainage patterns within the Land Control Area; the Project has been designed to avoid affecting existing drainage patterns.

9.2.1.4 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).

Wild Springs conducted wetland delineations in the Land Control Area; a copy of the Wetland Delineation Report is provided in Appendix F. According to field surveys, there are three wetland types in the Land Control Area, including the following:

- Palustrine Unconsolidated Bottom Wetland (PUB): Wetland bottom with at least 25 percent cover of particles smaller than stones and vegetative cover less than 30 percent.
- 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 Wetland: Wetlands and deepwater habitats contained within a channel, with two exceptions (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent.

The wetland classification and total area of wetlands by type occurring with the Land Control Area are shown in Table 9.2-1 and on Figure 11 – Waterbodies, Wetlands, and Floodplains. The USACE has the authority to regulate the discharge of dredged and fill material into jurisdictional waters of the U.S. Impacts to waters of the U.S. are reviewed, permitted, and mitigated through the CWA Section 404 permitting process. Wild Springs submitted the 2017 wetland delineation of the initial 1,000-acre Land Control Area to the USACE, which issued a JD on August 24, 2017 (see Appendix A – Agency Correspondence). Wild Springs conducted a second wetland delineation in the portion of the expanded Land Control Area not previously surveyed in late 2019, which was also submitted to the USACE. On March 18, 2020, the USACE issued a JD for all wetlands and waterbodies in the 1,643 acres surveyed, including the 1,499-acre Land Control Area (see Appendix A – Agency Correspondence).

Table 9.2-1 Delineated Wetlands in the Land Control Area	
Wetland Type (Cowardin Class [1979])	**Area (acres)**
Palustrine Unconsolidated Bottom Wetland (PUB)	2.4
Palustrine Emergent Wetland (PEM)	6.9
Riverine Wetland	0.2
All Wetland Types	**9.5**

In addition to 9.5 acres of wetlands in the Land Control Area, the USACE also issued a JD for portions of five intermittent streams that are drainages to Boxelder Creek (see Figure 10 – Waterbodies, Wetlands, and Floodplains).

9.2.1.5 Existing and Planned Water Rights

Wild Springs reviewed the SDDENR Water Rights, Location Notices, and Well Completion Report databases to identify where there are existing water uses within the Land Control Area (SDDENR, 2020a, b, and c). 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 that 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. A Location Notice is required for proposed dams that impound 25-acre feet or less at the primary spill way elevation, the water impounded is used for in-place uses such as stock watering, or fish and wildlife habitat, and the dam is constructed on a dry draw or non-navigable stream (SDDENR, 2020d). There is one Water Rights Permit, one Location Notice, and two wells in the Land Control Area.

Based on a review of SDDENR's Pending Applications to Appropriate Water and Future Use Reviews, there are no pending water right applications in Pennington County (SDDENR, 2020e).

9.2.1.6 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.

There are 135.2 acres of the 2013 FEMA 100-year floodplains within the Land Control Area associated with Boxelder Creek (Federal Emergency Management Agency [FEMA], 2013). Figure 11 – Waterbodies, Wetlands, and Floodplains.

9.2.1.7 National Park Service Nationwide Rivers Inventory

Pursuant to Section 5(d) of the National Wild and Scenic Rivers Act, the National Park Service (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, 2011). There are no NRI-listed rivers within the Land Control Area; the closest NRI segment listed is the Cheyenne River, which forms the eastern border of Pennington County approximately sixteen miles southeast of the Land Control Area.

9.2.1.8 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 considered impaired.

There are no 303(d)-listed waterbodies within the Land Control Area. However, Boxelder Creek located immediately north of the Land Control Area, is a 303(d)-listed waterbody for E. coli (SDDENR, 2018). This waterbody is listed as impaired without an approved Total Maximum Daily Load, which would define the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant. E. coli is typically associated with livestock; it is not a construction related parameter. Therefore, construction-related sediment will not contribute to Boxelder Creek's impairment.

9.2.2 General Construction and Operation Impacts on Hydrology

This section describes the potential effects of the Project on hydrological resources within the Land Control Area, including the effect on current or planned water uses and surface or groundwater resources.

9.2.2.1 Impacts to Hydrogeological Resources

Construction of the Project is not anticipated to have long-term impacts on groundwater resources. As discussed in Section 4.2.1, disturbances associated with Project construction activities are primarily limited to the upper fifteen feet, which is above the water table of the aquifers in the Land Control Area (Section 9.2.1.1). As such, no impacts to hydrogeological resources are expected.

9.2.2.2 Impacts to Waterbodies and Water Quality (ARSD 20:10:22:20)

There are portions of five intermittent streams that bisect the Land Control Area and flow to Boxelder Creek that the USACE determined were jurisdictional. Based on aerial photography and the wetland delineation data, the Project design avoids three of the five intermittent streams[3]. One jurisdictional waterway will be crossed by two access roads in the northwestern portion of the Preliminary Development Area and the second jurisdictional waterway would have collection lines bored beneath the waterway or utilize a Nationwide Permit along 230th Street in the southeastern portion of the Preliminary Development Area. The less precise data from the USACE indicates

[3] Note that the jurisdictional waterbodies provided by the USACE are similar to those in the National Hydrography Dataset; however, these drainages generally are coarser in scale and do not necessarily reflect waterways and drainages on aerial photography or the wetland delineation.

two additional drainages may be impacted by access roads. See Figures 4a-d – Detailed Preliminary Project Layout maps.

In areas where the Project design crosses jurisdictional waterways or other non-jurisdictional drainages, Wild Springs will utilize low water crossings. These crossings are engineered such that flow is maintained with culverts, yet the road can support vehicular traffic.

Construction of the Project will result in up to approximately 47.3 acres of new impervious surfaces (i.e., the substation and O&M building, inverter skids, parking areas, and access roads) in the Land Control 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.

9.2.2.3 Impacts to Wetlands

The Project has been designed to avoid impacts to delineated wetlands. Most wetlands have been excluded from the Preliminary Development Area. There are six wetlands, covering 0.7 acre within the Preliminary Development Area, that will be avoided by Project facilities such as access roads, solar arrays, and inverters. There is one wetland/waterbody complex along 230th Street in the southeast portion of the Preliminary Development Area where collection lines will either be bored beneath the wetland/waterbody or a Nationwide Permit for dredge and fill within waters of the U.S. under Section 404 of the CWA will be utilized.

9.2.2.4 Impacts on Current or Planned Water Use

The Project will not appropriate from surface waters in the Land Control Area, and will not conduct permanent dewatering, or deep well injection, and water storage, reprocessing, or cooling for either construction or operation of the facilities. If water is required for dust control, it will be obtained from municipal or other sources outside of the Land Control Area. Wild Springs will seek and comply with the conditions of the applicable permits for water appropriation.

Due to the lack of a rural water supply for the O&M building, a water supply well will be required. Water usage at the O&M building will be similar to a household volume, or approximately 400 gallons per day (United States Environmental Protection Agency [EPA], 2016). Wild Springs will seek and comply with the conditions of the South Dakota Water Right Permit for the water supply well. Wild Springs will also obtain a Wastewater Treatment System Operating Permit from Pennington County (Pennington County, 2019).

Based on a review the SDDENR Well Completion Report databases (SDDENR, 2020c), the two wells within the Land Control Area are outside of the Preliminary Development Area and will not be impacted by solar facilities (see Figure 11 – Waterbodies, Wetlands, and Floodplains). Similarly, the Water Rights Permit and Location Notice are within the Preliminary Development Area, but will not be impacted by solar facilities. These permits/notices are associated with existing water features (delineated wetland and jurisdictional waterway, respectively) which the Project design has avoided.

9.2.2.5 Impacts to Flood Storage Areas

There are 82 acres of 100-year floodplain in the northwestern portion of the Land Control Area. Wild Springs has completed an assessment to determine if the Project will result in any downstream adverse impacts to the base flood elevation and has coordinated with Pennington County on the results. An application for a Floodplain Development Permit will be submitted to Pennington County with all necessary materials, and the Project will be constructed in compliance with the Ordinance. The portion of the Project within the floodplain will be engineered to safely accommodate inundation for prolonged periods (interlocks, shutoffs, waterproofing), protected from potential flood debris, and designed to prevent adverse downstream impacts.

9.2.3 Mitigation Measures for Hydrology

Wild Springs has conducted formal wetland and waterbody delineations within the Land Control Area and received a JD for the wetland and waterbody boundaries. The preliminary Project design minimizes impacts to wetlands and waterbodies. Where collection lines for the solar facility cross waterbodies, they will either be bored underneath the features or a Nationwide Permit for dredge and fill will be utilized. Some access roads for the Project will cross waterbodies; Wild Springs will install culverts in these locations to maintain water flow; therefore, impacts on waterbodies will be minimal. Figures 4 and 5a-d depict the locations where collection lines and access roads will cross waterbodies within the Preliminary Development Area. Wild Springs anticipates waterbody impact thresholds will fall under a Nationwide Permit for dredge and fill within waters of the U.S. 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 shall be in place to minimize the negative impacts to receiving waters caused by stormwater discharges associated with the construction activities.

Construction dewatering will be conducted in accordance with the General Permit for Temporary Discharge Activities (Permit No.: SDG0700000) 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.

With implementation of the erosion and sediment controls outlined in the Project SWPPP and adherence to the requirements of the stormwater and dewatering permits, no significant impacts to water quality from construction and operation of the Project are expected.

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

Terrestrial ecosystem data were collected from literature searches, federal and state agency reports and consultations, and natural resource databases. Biologists from Area M conducted field surveys on behalf of Wild Springs for the various iterations of the Land Control Area to provide site-specific information on terrestrial resources. The results of these surveys are summarized in the applicable sections below.

9.3.1 Vegetation

9.3.1.1 Existing Vegetation

As part of the Natural Resource Strategy (Appendix G), Wild Springs identified existing vegetative cover types within the Land Control Area. The Natural Resource Strategy report provides additional information about existing vegetation and wildlife habitat in the Land Control Area. Information gathered by these studies was used to assess the current and future potential wildlife habitat value, and plan for restoration and ongoing land management. To that end, Wild Springs developed a Vegetation Management Plan (Appendix C) that will be used during restoration and ongoing operation of the Project. A discussion of rare plants that may be present within the Land Control Area is provided in Sections 9.3.4 and 9.3.5.

The Land Control Area is located within the Northwestern Great Plains Level III Ecoregion and the Semiarid Pierre Shale Plains Level IV Ecoregion of South Dakota (EPA, 2013). The Northwestern Great Plains is characterized by semiarid plains of shale, siltstone, and sandstone with occasional buttes and badlands (Bryce et al. 1998). Native grasslands have persisted in areas of steep or broken topography, but have largely been replaced by spring wheat and alfalfa, although agriculture is limited in the region due to erratic precipitation and irrigation limitations (Bryce et al. 1998). The Semiarid Pierre Shale Plains are dry, with only one or two inches of precipitation per year (Bryce et al. 1998).

As discussed further in Section 9.5.1 and shown in Table 9.5-1, Wild Springs also reviewed USGS National Land Cover Data (NLCD) within the Land Control Area. The NLCD data classifies the majority of the Land Control Area as herbaceous land (75.5 percent) and cultivated cropland (21.4 percent). Based on the Natural Resource Strategy, the land classified as Developed in the NLCD data generally consists of roads bisecting the Land Control Area; and land classified as Barren and Shrub/Scrub cover types are associated with the WAPA substation. Vegetation in the Developed and Barren landcover categories generally lack diversity, consisting largely of invasive and noxious species, or lack vegetation all together (USGS, 2011). Further, based on the Natural Resource Strategy, no shrubs were observed in the WAPA substation area. In addition, the Open Water category is represented by embanked wetlands and stock ponds in the Land Control Area, and generally exhibits less than 25 percent vegetative cover. As such, these categories are not discussed further in this section (see Section 9.5.1). The remaining vegetated landcover types are described further below.

The Natural Resource Strategy revealed that land classified as herbaceous land includes pasture, hay, and fallow grassland areas. Dominant or co-dominant grass species observed include western wheat grass, crested wheatgrass, blue grama, buffalograss, and *Poa* spp. (bluegrass). In general,

areas with less-intensive grazing and on ridgetops with shallow soils are plant associations dominated by the native shortgrass species blue grama and buffalograss, whereas the more heavily grazed and disturbed areas have plant associations that are dominated by the non-native crested wheat grass or bluegrass. Observations made during field reconnaissance indicate that cattle have seasonal access to graze these areas, and much of the acreage modeled as herbaceous land appears to be seasonally hayed.

Field verification efforts noted that cultivated cropland in the Land Control area is predominantly used to produce annual crops such as alfalfa, hay crop, and wheat and also includes all land being actively tilled. Cultivated cropland is predominately in the northwestern portion of the Land Control Area.

The Emergent Herbaceous Wetland NLCD category includes areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetation cover and the soil is periodically saturated with water. Within the Land Control Area, emergent herbaceous wetlands are associated with Boxelder Creek. Field observations noted few wetland communities within the Land Control Area, but those that occur grow within small drainage swales or around embanked ponds and typically contain a small fringe component of sedge (*Carex* spp.) or cattails (*Typha* spp.) depending on wetland type.

9.3.1.2 Impacts to Vegetation

Cultivated cropland in the Preliminary Development Area will be converted from its existing use to solar energy use for the life of the Project, but most will be preserved, and the soils given the opportunity to rest and regenerate (1,060.8 acres). Furthermore, approximately 96 percent of the land in the disturbed area will be restored as open, herbaceous (i.e., within the racking area) rangeland cover. Only approximately 4 percent (47.3 acres) of the land in the disturbed area will be converted to impervious surfaces (i.e., the substation and O&M building, inverter skids, parking areas, and access roads). Additionally, Wild Springs will need to remove up to five small, isolated trees in the Land Control Area.

9.3.1.3 Mitigation Measures for Vegetation

As described in Section 4.5.4, Wild Springs has developed two seed mixes that could be used for revegetation, depending on the management style of grazing or mowing. A third seed mix, a wet mix, would be used in limited areas in either management scenario. Seed mixes are designed to be native, blend with the surrounding landscape, and are developed in coordination with the NRCS to design a mix that will achieve Wild Spring's goals for operating the solar facility, establish stable ground cover successfully, reduce erosion, reduce runoff, and improve infiltration. Wild Spring's VMP includes the proposed seed mixes and is included in Appendix C.

9.3.2 Noxious and Invasive Species

9.3.2.1 Existing Noxious and Invasive Species

Noxious and invasive weeds are regulated by State (SDCL 38-22) and Federal (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) and Pennington County, 13 listed species of noxious weeds have the potential to occur and are regulated within Pennington County (SDDOA, 2012a and 2012b; Pennington County, undated). Seven of these species are listed statewide, and the remaining six species are locally listed for Pennington County (Table 9.3-1).

Table 9.3-1 State and Local Noxious Weeds of South Dakota

Common Name	*Scientific Name*	State Weed Status	Recorded at Wild Springs?
Hoary cress	*Cardaria draba*	State noxious weed	No
Spotted knapweed	*Centaurea maculosa*	Local noxious weed	No
Russian knapweed	*Centaurea repens*	State noxious weed	No
Spotted knapweed	*Centaurea stoebe*	Local noxious weed	No
Canada thistle	*Cirsium arvense*	State noxious weed	Yes
Houndstongue	*Cynoglossum officinale*	Local noxious weed	No
Leafy spurge	*Euphorbia esula*	State noxious weed	No
Oxeye Daisy	*Leucanthemum vulgare*	Local noxious weed	No
Purple loosestrife	*Lythrum salicaria*	State noxious weed	No
Sulphur cinquifoil	*Potentilla recta*	Local noxious weed	No
Perennial sow thistle	*Sonchus arvensis*	State noxious weed	No
Salt cedar	*Tamarix aphylla, T. chinensis, T. gallica, T. parviflora, and T. ramosissima*	State noxious weed	No
Common Tansy	*Tanacetum vulgare*	Local noxious weed	No
Puncturevine	*Tribulus terrestris*	Local noxious weed	No

Source: SDDOA 2012a and 2012b; Pennington County, undated

As part of the Natural Resource Strategy conducted by Wild Springs, incidental observations of noxious weeds were recorded (Table 9.3-1). Wild Springs observed the Canada thistle, a state noxious weed, located primarily along roadsides, disturbed areas, and wetland perimeters.

9.3.2.2 Impacts Related to Noxious and Invasive Species

During field surveys for the Natural Resource Strategy, Wild Springs incidentally recorded one of the 13 state and local noxious weeds with potential to occur in Pennington County (Canada thistle) within the Land Control Area (Table 9.3-1). Construction and operation of the Project has the potential to introduce noxious and invasive species into areas where these species previously did not exist. For example, construction vehicles traveling from one area to another could inadvertently spread noxious and invasive species from roadside ditches or disturbed areas unless BMPs are used to minimize or avoid introducing or spreading these species.

9.3.2.3 Mitigation Measures for Noxious and Invasive Species

The VMP outlines noxious weed control measures that Wild Springs will implement, which include identifying and establishing the procedures that will be used to prevent the introduction and spread of noxious and invasive weeds during construction and ongoing operations. During restoration, Wild Springs will utilize a seed mix that is free of noxious and invasive weeds. Furthermore, Wild Springs will revegetate with seed mixes recommended by the USDA NRCS.

9.3.3 Wildlife

9.3.3.1 Avian Species

Project-specific wildlife surveys began in April 2017 and are ongoing (Table 9.3-2). Wild Springs consulted with the USFWS and SDGFP to identify which species and/or habitat surveys were needed (see Appendix A – Agency Correspondence). Survey types and dates of surveys are summarized in Table 9.3-2. The 2017 and 2020 Prairie Grouse Survey Reports and the 2020 Ground-based Raptor Nest Surveys are included in Appendix H and have been provided to USFWS and SDGFP.

Table 9.3-2 Summary of Wildlife Studies for the Wild Springs Solar Project

Survey Type	Dates
Sharp-tailed Grouse and Greater Prairie Chicken Lek Surveys	April 2017 April 2020
Ground-based Raptor Nests Surveys	April 2017 October and November 2019 April 2020
Breeding Bird Survey	May and June 2020 Years 2 and 4 Post-Construction

Lek Surveys

Prairie grouse leks or booming grounds are historic areas where males annually display for courtship and mating. Leks are typically located on small rises with shorter vegetation, allowing maximum visibility for courtship activities and predator vigilance. Males begin establishing territories on leks in late February to early March, with females typically beginning to attend in late March to early April (Johnson et al. 2011, Connelly et al. 1998).

Surveys for greater prairie-chicken and sharp-tailed grouse leks were conducted throughout the 2017 Land Control Area on April 10-14, 2017, using multiple survey methods including point observations, pedestrian transects, and field investigations for sign. No leks were documented within the Land Control Area. Wild Springs conducted a second lek survey in April 2020; no leks were documented in the current Land Control Area.

Raptor Nests

Ground-based surveys for raptor nests were conducted in October and November 2019 to document protected species and inventory incidental wildlife species, including eagle and raptor

nests. Within the Land Control Area, surveyors documented only the remnants of one potential raptor nest in the western part of the Land Control Area; in its condition at the time of survey, the nest was no longer functional. Wild Springs conducted additional ground-based surveys for raptor nests in April 2020; no raptor nests were recorded in the Land Control Area.

Breeding Bird Surveys

Wild Springs will conduct a breeding bird survey during the avian breeding and nesting season (late May through June of 2020) to gather information on species presence, distribution, and relative abundance within the Land Control Area. In particular, this survey will assess the presence of any BCC species that might nest at the site. The survey will involve point-count methodology similar to Ralph (1993) and Rosenstock et al. (2002). Sampling locations for point-count surveys will be identified within the Land Control Area using a two-stage randomized process to maximize the area covered. Appropriate data will be recorded to provide estimates of bird diversity, species richness, bird count, percent of count, and frequency of occurrence. After the Project goes into operation, two breeding bird surveys will be completed within the Project site and adjacent reference areas for comparison (two years and four years after construction). These pre- and post-construction surveys will be designed to allow for an assessment of the wildlife habitat value and function within an operating solar facility.

Migratory Birds

Migratory birds are federally protected under the Migratory Bird Treaty Act (MBTA), and bald eagles are protected under the MBTA and Bald and Golden Eagle Protection Act (BGEPA) (USFWS, 2007; USFWS, 2018). The MBTA protects migratory birds and most resident birds that are native to the U.S. from take. The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines (USFWS, 2015). BGEPA protects and conserves bald eagles and golden eagles from intentional take of an individual bird, chick, egg, or nest, including alternate and inactive nests (USFWS, 2007). Unlike the MBTA, BGEPA prohibits disturbance that may lead to biologically significant impacts, such as interference with feeding, sheltering, roosting, and breeding or abandonment of a nest (USFWS, 2007).

Birds of Conservation Concern

The USFWS lists 28 species as Birds of Conservation Concern (BCC) within the Badlands and Prairies Bird Conservation Region (BCR) where the Project is located (USFWS 2008) and five additional BCC species within the nearby Shortgrass Prairie BCR (USFWS 2008); the USFWS has determined that two of these species have the potential to occur at the Project location: golden eagle and lark bunting (USFWS, 2019a). Additionally, since prairie dog colonies are present in the area, and burrowing owls (BCC and a species of greatest conservation need in South Dakota (SDGFP, 2014)) may use prairie dog burrows for nesting, this species also has the potential to occur at the Project location.

A review of eBird data (2019) indicates that golden eagles have been sighted within one mile of the Project as recent as 2013, but that sightings are infrequent and primarily occur west of the

Project near the Black Hills National Forest (eBird 2019). Lark buntings have also been sighted within one mile of the Project as recent as 2014, but the majority of sightings occur south and west of the Project in the Black Hills National Forest, Buffalo Gap National Grasslands, and Badlands National Park (eBird 2019). Neither of these species have been observed incidentally during field visits in 2017, 2019, and 2020 (see Appendix G – Natural Resource Strategy). One burrowing owl observation was recorded in 2013 just to the west of the Project along Boxelder Creek; however, similar to lark buntings, the majority of sightings occur south of the Project in the Buffalo Gap National Grasslands and Badlands National Park (eBird 2019). Burrowing owls were incidentally observed during wetland delineations in Spring 2017 at a prairie dog colony within the Land Control Area.

As discussed in Section 9.5.1, the Land Control Area is comprised primarily of herbaceous land (75.5 percent) and cultivated crops (21.4 percent). In addition, there are smaller amounts of developed areas (2.5 percent), open water (0.1 percent), barren land (0.4 percent), shrub/scrub (0.1 percent), and emergent herbaceous wetland (less than 0.1 percent). The herbaceous areas include lands used for grazing and hay production and fallow areas; nests of grassland species in these areas would likely be disturbed by grazing cattle and agricultural equipment. Few wetland- or water-dependent birds such as waterfowl or waterbirds would use the Land Control Area for nesting given the small amount of open water and wetlands. Overall, based on the predominance of agricultural lands and herbaceous areas used for grazing and hay production within the Land Control Area, absence of forested areas, and the small amount of open water and wetlands, few BCC are likely to use the Land Control Area as habitat.

USFWS South Dakota Grassland Birds of Fragmentation Concern

The USFWS has also noted concerns about avian species that are at risk from habitat fragmentation and has developed a list of species at risk specific to South Dakota (Bakker, 2020). Species of habitat fragmentation concern are impacted when larger areas of habitat are divided into smaller areas with concomitant reductions in habitat connectivity (USFWS, 2012). The Bakker report identified 21 grassland bird species that have shown negative effects when their habitats are fragmented. The report focuses on fragmentation due to wind turbines, but also includes other energy development (oil and gas, natural gas), transmission, and transportation; none of the species profiled have been researched for fragmentation from solar development. Of the 21 species in the Bakker report, SDGFP notes that eleven of these species may occur in the Land Control Area (Appendix A – Agency Correspondence).

At present, the Land Control Area is bisected by roads and transmission lines; given the degree of fragmentation, grassland species that are area sensitive are not expected to breed in the Land Control Area. If species of habitat fragmentation concern are present in the Land Control Area, they have adapted to the fragmentation and current land uses.

USGS Breeding Bird Survey

The USGS North American Breeding Bird Survey (BBS) is a collaborative effort between the USGS Patuxent Wildlife Research Center and Environment Canada's Wildlife Service. The objective of the survey is to monitor the status and trends of North American bird populations via standardized protocol collected by participants along thousands of randomly established roadside

routes throughout the continent. The closest BBS routes, Railroad Butte and Owanka, are approximately 10 miles southwest and 11 miles southeast of the Project, respectively.

The Railroad Butte BBS route has been monitored a total of 22 years between 1995 and 2018. A total of 72 bird species have been observed along this route, with annual species numbers ranging from 19 in 2008 to 31 in 1996 (Pardieck et al. 2019). The most common species were western meadowlark, mourning dove, and lark bunting. One golden eagle observation has been recorded along this route, in 2017. Both of the BCC species identified above have been documented along the Railroad Butte BBS route.

The Owanka BBS route has been monitored a total of 37 years between 1967 and 2014. A total of 100 bird species have been observed along this route, with annual species numbers ranging from 25 in 2009 to 45 in 2002 (Pardieck et al. 2019). The most common species were western meadowlark, lark bunting, and red-winged blackbird. Golden eagles were infrequently seen along this route, with golden eagles observed in 1983, 1984, 1985, 1990, 1993, 1994, and 2001, for a total of 10 observations, and none were observed all other years that the route was surveyed. Additionally, both BCC species identified above were also documented.

During the reconnaissance surveys in 2019 and previous surveys in 2017, the most common species observed by Area M biologists were western meadowlarks, horned larks, and vesper sparrows (see Appendix G – Natural Resource Strategy).

9.3.3.2 Other Species of Wildlife

In addition to birds, wildlife in the Land Control Area may also include bats, prairie dogs, and other wildlife species.

Bats

Six bat species occur in eastern South Dakota (Harvey et al. 2011, Bat Conservation International 2016). These include big brown bat, eastern red bat, hoary bat, little brown bat, northern long-eared bat (NLEB), and silver-haired bat. These species could potentially occur in the Project vicinity during all seasons except winter, when they are hibernating or have migrated to warmer places. More detailed information on the federally listed NLEB is provided in Section 9.3.4.

As described in the vegetation section, forested habitat was identified within the Land Control Area based on NLCD data. As part of the Natural Resource Strategy, Western EcoSystems Technology, Inc. (WEST) conducted an additional desktop analysis of the Land Control Area using true-color aerial imagery and identified scattered patches of shrubs and trees comprising approximately 0.19 ac and would likely not be considered suitable for the bat species listed above. The nearest potentially suitable habitat is the forested corridor along Boxelder Creek, located within one mile and to the northeast of the Project. Due to the paucity of forested habitat and migration corridors, it is unlikely that these bat species will exhibit high use of the Project.

Prairie Dog Colonies

During general wildlife reconnaissance surveys in 2019, surveyors documented two black-tailed prairie dog colonies in the southwest corner of the Land Control Area. Prairie dogs are not

protected species, but their colonies may provide habitat for other species of wildlife, such as swift fox, black-footed ferret, and burrowing owl.

Other Wildlife

In addition to birds, other groups of wildlife that may occur in the Land Control Area include mammals, reptiles, and insects. Mammals that may be present include white-tailed deer, mule deer, striped skunk, red fox, raccoon, badger, Virginia opossum, and coyote. Reptiles that may occur in the Land Control Area are plains garter snake, gopher snake, and prairie (eastern fence) lizard (SDGFP, undated). Fish species are unlikely to be present in the Land Control Area given the small amount of open water (see Section 9.5.1). Some pollinator insects may be present in the Land Control Area including native bees, butterflies, and moths.

9.3.3.3 Impacts to Wildlife

Although solar power has been identified as providing a positive effect on the environment when replacing or reducing certain other energy sources, research is on-going as to understanding the potential direct (e.g. mortality) and indirect (e.g. habitat modification) impacts of these facilities on nearby natural resources, including wildlife (Moore et al. 2017; Taylor et al. 2019). However, studies related to the interaction of wildlife species with human disturbance offer lessons for proper development of solar projects. The following sections examine the known and potential impacts associated with the construction/decommissioning and the operation of these facilities, as well as planning and design measures to minimize these concerns throughout all phases of the Project's life cycle.

Impacts due to Construction and Decommissioning

The construction and later decommissioning of solar facilities requires ground disturbance. Similar to other construction projects, there are potential associated impacts to habitat and wildlife, including mortality, disturbance, and habitat modification due to the installation and removal of equipment (e.g. arrays, substation) and other construction-related activities, such as road installation, dust suppression, and transporting of equipment from off-site locations (Lovich and Ennen, 2011). The Project has proposed BMPs for sustainable development of solar facilities that will reduce the potential for direct impacts during construction (see Section 9.3.3.4).

Given that the Project is comprised primarily of herbaceous lands that are grazed or hayed, agricultural lands, and developed lands (over 75 percent) that are bisected by roads and transmission lines, occurrence of wildlife within the Land Control Area is limited to species adapted to disturbed and fragmented landscapes. Common species of wildlife adapted to agricultural land use may be present. During construction, highly mobile species of wildlife including big game, raptors, birds, and snakes are expected to divert to surrounding areas. No leks are present in the Land Control Area; thus, no impacts on leks are expected. Based on Wild Springs' re-design of the solar array layout, no wildlife adapted to using prairie dog colonies are expected to occur within the solar arrays. Overall, construction of the Project is expected to have minimal impacts on wildlife species individuals, and no impact on populations of these species. Furthermore, approximately 96 percent of the disturbed area will be revegetated with a rangeland

seed mix that has been developed in coordination with the local NRCS office and is substantially similar to plant species observed during field surveys.

Impacts due to Operation

The literature generally suggests that, with proper planning, the ecological impacts of ground-mounted solar panels will be relatively limited and location-specific (Moore et al., 2017; Taylor et al., 2019)). Consultation with stakeholders (such as the USFWS and SDGFP) have identified concerns related to potential impacts to birds and mammals. Bats are not known to collide with stationary objects, as such, impacts to bats are not expected. Further, as described above, the Land Control Area lacks bat habitat.

Direct Impacts

There is the potential for direct avian mortality at solar facilities due to collision with PV panels (Smith and Dwyer, 2016; Kagan et al., 2014). However, based on available research, PV solar facilities appear to pose a low risk for avian mortality relative to other sources of bird mortality. A recent review completed by WEST (2020 manuscript in prep.) that included a review of 13 PV solar facilities in desert and grassland habitats of California and Nevada concluded that the average annual fatality rate at PV solar facilities is 1.82 bird fatalities/MW/year. As a point of comparison, Sovacool (2009) estimated a fatality rate of 74.2 birds/MW/year from fossil fuel power plant operations. The Project is not anticipated to experience a higher-than-average mortality, given the abundance of comparable habitat in close proximity.

Some water-obligate species, including species of loons and grebes, have been found within solar projects located within the desert portions of the southwest U.S (WEST 2020 manuscript in prep). In total, 36 grebe, 13 loon, 24 coot, and 10 duck deaths have been identified across 10 solar facilities. The large amount of solar now installed across the country and the lack of reports or anecdotes of significant water-obligate bird discoveries suggest that solar facilities are not a widespread or significant cause of waterbird mortality.

Indirect Impacts

Several studies have documented altered avian use patterns at PV solar facilities, with mixed results. A study of eleven solar sites in the southern United Kingdom found a significantly higher diversity of birds within the solar plots compared to the adjoining land (Montag et al., 2016). A 2019 study published in Germany collected data from 75 solar facilities on “derelict” land and found that the installation of these PV solar facilities could improve biodiversity. In contrast, the Jasper PV solar facility in South Africa reported that bird species richness and density within the PV facility tended to be lower than the boundary zones and adjacent undisturbed land, suggesting that birds may avoid solar facilities once they are operational (Visser et al., 2019). A study conducted at PV arrays and nearby airport grasslands in Arizona, Colorado, and Ohio observed lower species diversity at solar arrays, but there were twice as many birds per hectare in the solar arrays than in the airfield areas (DeVault et al., 2014).

In terms of raptors, preliminary findings from avian point-count studies conducted at the California Valley Solar Ranch in south-central California documented no use of constructed solar arrays by

raptors (Smitt et al., 2013). A later study at the same facility documented higher raptor abundance pre-construction than post-construction, suggesting that raptors may avoid facilities once they are operational (Smith and Dwyer, 2016). These finding are consistent with the previously discussed study by DeVault et al. (2014), where large birds were also less common at PV arrays than nearby airfield sites. The results of these studies suggest that some avian species, such as large birds and raptors, likely avoid operational solar facilities while other species may actually prefer the artificial or restored habitat to the available natural habitat in the area.

Two additional studies have collected data to support this hypothesis. Avian point counts were conducted at the Topas Solar Farms in San Luis Obispo County, California, both during construction and for three years post-construction (Griffiths et al., 2019). This study documented no negative impacts to avian use from construction or operation of the solar farm, and documented an increase in species richness (Griffiths et al., 2019). Overall wildlife and habitat studies conducted at the same facility documented higher vegetation productivity on site than in surrounding reference sites (Sinha et al., 2018). Additionally, numerous wildlife species, including 27 bird species, eight mammal species, and four reptile species, with six of the total species having special conservation status, were recorded using habitat at the solar facility (Sinha et al., 2018). These studies suggest that the development of the solar farm can create habitat that may benefit wildlife species through providing resources that would not normally be available within the surrounding habitat, and can potentially increase habitat quality through strategic restoration and land management.

9.3.3.4 Mitigation Measures for Wildlife

Wild Springs has worked with the USFWS and SDGFP to redesign the site layout to avoid or minimize impacts to prairie dog colonies, wetlands/waterbodies, and drainages. In addition, Wild Springs proposes the following mitigative measures for wildlife:

- In order to avoid impacts on wildlife that use the 2019 mapped prairie dog colonies, Wild Springs re-designed the Project so that the Project's perimeter fence excludes the 2019 mapped extent of both prairie dog colonies. In addition, Wild Springs will implement USFWS and SDGFP recommendations on fencing or vegetation management to minimize the potential for colony expansion into the Preliminary Development Area. This may mean maintaining vegetation near the prairie dog colonies at a height taller outside the arrays to deter prairie dogs from encroaching. Finally, if construction commences in the of Fall 2021, isolated burrows that could be used by burrowing owls for nesting outside the 2019 mapped colonies' extent and within the fenceline will be collapsed after the breeding season (May 15 to August 15). Larger burrows that could be used by larger mammals (e.g., badger or Swift fox) will be left intact but monitored for activity during the natal denning season (April 15 to July 1) and collapsed if not active. Alternatively, if construction does not commence until the Spring of 2022, any existing burrows that could be used by burrowing owls for nesting or larger burrows that could be used by a badger or Swift fox will be collapsed outside of the nesting and denning season in the early Winter of 2021. Collapsing burrows prior to construction should minimize the potential for sensitive species like burrowing owls and Swift fox to use the Project area and potentially be disturbed by construction activities.

- During May and June 2020, Wild Springs will evaluate the 2019 mapped prairie dog colonies for suitable Swift fox dens, which are larger than the prairie dog holes and typically measure [7-8 inches wide and 8-9 inches tall]. Potential suitability will help Wild Springs assess whether the species is currently present.
- Prior to construction, if burrowing owls or Swift fox are observed utilizing the prairie dog colonies during the nesting and denning seasons, consistent with SDGFP recommendations, Wild Springs will avoid construction within quarter mile of the nest or den until after the nesting and/or natal denning season. To minimize impacts on big game species, Wild Springs will fence the perimeter of the Land Control Area to prevent big game species from entering and will ensure that no big game species are within the fence during construction.
- Wild Springs will need to remove up to five small, isolated trees in the Land Control Area that are not considered bat habitat and has sited the Project to avoid permanent wetland impacts which addresses a SDGFP recommendation to avoid bat habitat—in particular, forested areas and wetlands and other areas of potential high bat activity.
- Wild Springs plans to minimize grading as the site conditions allow and will revegetate all areas of temporary construction disturbance with a native grass mix. This will stabilize the soil and create/maintain wildlife habitat.
- Wild Springs proposes to conduct pre- and post-construction breeding bird surveys to determine if any displacement or change in avian use would occur.
- Wild Springs will consider other measures to enhance wildlife habitat.

Finally, because direct and indirect impacts from a solar facility in a grassland setting are not well understood, Wild Springs will conduct a two-year scientifically rigorous post-construction study to assess potential impacts to grassland birds. Wild Springs anticipates this will be one of the first studies in the Upper Midwest to evaluate the impacts of a solar facility in grassland and herbaceous habitat, and will be valuable for agencies and developers.

9.3.4 Federally Listed Species

9.3.4.1 Federally Listed Species

Wild Springs reviewed the USFWS Information for Planning and Conservation (IPaC) website for the federally endangered and threatened species, candidate species, and designated critical habitat protected under the federal Endangered Species Act (ESA) that may occur within the Land Control Area (Table 9.3-5). In addition, the SDGFP conducted a review of the South Dakota Natural Heritage Database (SDNHD) for the Land Control Area. The SDNHD houses records of threatened and endangered species and rare species documented in the state. Based on the SDGFP's review of SDNHD, no threatened, endangered, or rare species were documented within the Land Control Area.

Wild Springs developed a Project-specific list of federally-listed species that may occur in the Land Control Area based on consultations with the USFWS South Dakota Field Office and information available online from the USFWS IPaC system (www.fws.gov/ipac). In a letter dated July 3, 2017, the USFWS South Dakota Field Office provided a Project-specific list of federally endangered and threatened species that may occur in the Land Control Area; this list included the

whooping crane (*Grus americana*) and NLEB (*Myotis septentrionalis*). Wild Springs's review of the USFWS IPaC system indicated that four species may occur in the Land Control Area: whooping crane, NLEB, rufa red knot (*Calidris canutus rufa*), and least tern (*Sterna antillarum*) (Table 9.3-3).

Table 9.3-3 Federally Listed Species That May Occur in the Land Control Area

Scientific Name	Common Name	Federal Status
Myotis septentrionalis [1, 2]	Northern Long-eared Bat	Threatened
Calidris canutus rufa [1]	Rufa Red Knot	Threatened
Grus americana [1, 2]	Whooping Crane	Endangered
Sterna antillarum [1]	Interior Least Tern	Endangered

[1] Federally-listed species that may occur within the Land Control Area according to the USFWS Information for Planning and Consultation system (https://ecos.fws.gov/ipac/)

[2] Federally-listed species that may occur in the Land Control Area according to the USFWS South Dakota Field Office in correspondence dated July 3, 2017.

Northern Long-eared Bat

The NLEB is listed as threatened under the Federal ESA. It is medium-sized bat species that occurs across the eastern and central U.S. (Caceres and Barclay, 2000). The annual life history of the NLEB includes an inactive period when the species is hibernating and an active period when the species forages, raises its young, and breeds. Hibernation generally occurs in caves and mines between November 1 and March 31 (USFWS, 2016a; USFWS 2016b). In April, the species emerges from its hibernacula and moves to summer habitat. NLEB typically forage on flies, moths, beetles, caddisflies, and other insects in the understory of wooded areas (USFWS, 2016b). Adult females form breeding or maternity colonies that are variable in size, ranging from a few individuals to as many as 60 adults (Caceres and Barclay, 2000; Wisconsin Department of Natural Resources, 2015). During the summer, the species roosts in live and dead trees in cavities and crevices and under bark (Timpone et al., 2010). The NLEB forages primarily in forested areas (USFWS, 2016b). The NLEB is currently declining due to a disease that affects hibernating bats called white-nose syndrome (WNS).

Rufa Red Knot

The occurrence of the federally-threatened rufa red knot in South Dakota is unpredictable, and the number of migrating shorebirds documented in the interior can vary dramatically due to high inter-annual availability in water levels and habitat quality at mid-continental wetlands. The wetlands with open water in the Land Control Area may represent suitable stopover habitat, but these wetlands are limited (USFWS, 2014b). No rufa red knots have been documented in the Land Control Area based on the SDGFP's review of the SDNHD. Given the limited habitat in the Land Control Area, the unpredictability of rufa red knots in South Dakota, and the absence of records within the Land Control Area, Wild Springs expects that the likelihood that rufa red knots will use the Land Control Area during migration is very low.

Whooping Crane

Whooping cranes do not live year-round in South Dakota; individuals in the Aransas-Wood Buffalo Population are present during their twice-yearly migration between their summer breeding habitat and wintering habitat (Canadian Wildlife Service and USFWS, 2007). Specifically, whooping cranes have been documented migrating through South Dakota between March 24 to May 19 and September 14 and November 18 (WAPA and USFWS, 2015). Whooping cranes use wetlands and cropped lands during migration. The Land Control Area is outside of the corridor where 95 percent of whooping cranes in South Dakota have been documented.

Interior Least Tern

The interior least tern is a migratory bird species that nests along freshwater habitats of the Mississippi and Missouri and their major tributaries. The species typically nests on sand bars or along river channels, but may also nest on the shores of reservoirs, on gravel and sand mines, coal mines, and industrial sites, with appropriate conditions. They forage for fish along rivers and reservoirs (USFWS, 2019b).

9.3.4.2 Impacts to Federally Listed Species

As further detailed in the below sections, Wild Springs anticipates no impacts on federally threatened and endangered species due to Project construction and operations due to the low likelihood or frequency of species presence in the Land Control Area and implementation of species-specific conservation measures, as appropriate.

Northern Long-eared Bat

Suitable habitat for the NLEB is not present in the Land Control Area. The species is forest-dependent and requires forested areas for roosting in summer; no forested areas are within the Land Control Area. The species overwinters in hibernacula and is not present on the landscape in winter months. Desktop analysis and wildlife reconnaissance surveys did not identify features (i.e., caves or mines) that would provide suitable winter habitat within the Land Control Area.

On April 1, 2015, the USFWS listed the NLEB as threatened under the ESA and simultaneously published an interim 4(d) rule; the final listing and interim 4(d) rule took effect as of May 4, 2015. On January 14, 2016 the USFWS published the final 4(d) rule identifying prohibitions that focus on protecting the bat's sensitive life stages in areas affected by White Nose Syndrome (WNS) (USFWS, 2016a; 2016b). The 4(d) rule allows incidental take of the species resulting from otherwise lawful activities. The 4(d) rule and the associated biological opinion are intended for use by agencies to streamline consultation for NLEB. Under the provisions of the 4(d) rule, for projects within the WNS Zone, incidental take is not prohibited if there is no project activity within hibernacula, no tree clearing within 0.25 mile from known hibernacula, no clearing of maternity roost trees, and no tree clearing within 150 feet from known maternity roost trees during June and July. Pennington County, South Dakota is within the WNS Zone (USFWS, 2019c). However, there are no documented hibernacula within the Land Control Area. Up to five isolated trees will be cleared as a result of Project construction, but these trees are not considered suitable bat habitat (see Appendix G – Natural Resource Strategy). Thus, per the Final 4(d) Rule for the NLEB

(USFWS, 2016b), the Project will not result in prohibited incidental take because Wild Springs will not conduct Project activities within known hibernacula, will not be clearing known maternity roost trees or trees within 150 feet of known maternity roost trees between June 1 and July 31, and will not remove trees within 0.25 mile of a known hibernacula at any time of the year.

Rufa Red Knot

During migration, the rufa red knot may stop opportunistically to forage and roost at wetlands and lakes in South Dakota; however, their occurrence is infrequent (USFWS, 2014). There are no SDNHD records for the species within the Land Control Area. The likelihood of the species occurring in the vicinity of the Project is very low, given the few areas of open water in the Land Control Area. Thus, Wild Springs expects the Project to have "no effect" on rufa red knot individuals or suitable habitat.

Whooping Crane

The Land Control Area is located outside of the migration corridor where 95 percent of migrating whooping crane have been documented in South Dakota. By siting the Project outside of the 95 percent migration corridor and away from the more concentrated use areas in the center of the corridor, Wild Springs significantly reduced the likelihood of whooping crane stopovers and associated potential impacts. Project construction and operations would likely result in any migrating whooping crane individuals diverting from the Land Control Area and would not impact individuals. Thus, Wild Springs expects that the Project will have "no effect" on whooping cranes.

Least Tern

Interior least terns typically nest on sand bars along the Mississippi and Missouri rivers and their tributaries and forage for fish that live in these waterbodies. No suitable nesting habitat is present in the Land Control Area; thus, Wild Springs expects that the Project will have "no effect" on the Interior least tern.

Summary of Impacts on Federally Listed Species under Section 7 of the ESA

Projects involving a federal nexus, such as Federal lands, funding, or authorizations, require consultation between the Federal agency and the USFWS if a federally-listed species or designated critical habitat may be affected, pursuant to Section 7 of the federal ESA. This Project's Federal nexus for Section 7 of the ESA is the interconnection with the WAPA transmission system. Based on the review of potential impacts provided above, Wild Springs expects that the Project will have "no effect" on the rufa red knot, whooping crane, and Interior least tern. Per the 4(d) rule and associated biological opinion for the NLEB, the Project will not result in prohibited incidental take of NLEB individuals.

9.3.4.3 Mitigation Measures for Federally-listed Species

Conservation measures outlined for wildlife in Section 9.3.3.4 would also apply to federally-listed species in the Land Control Area. No species-specific conservation measures are currently proposed for the NLEB, whooping crane, rufa red knot, and least tern because no impacts are anticipated on these species.

9.3.5 State-listed Species

9.3.5.1 Existing State-listed Species

Within South Dakota, the SDGFP is the agency responsible for managing game and non-game wildlife and habitat, including species listed under the state endangered species law (SDCL Chapter 34A-8). South Dakota's endangered species law regulates the taking, importation, transportation, and sale of state endangered or threatened species. SDGFP administers the state list of rare, threatened, and endangered species. There are 11 state-listed species that may be present in Pennington County, South Dakota (Table 9.3-4).

Table 9.3-4 State-Listed Species That May Occur in Pennington County [1]

Scientific Name	Common Name	State Status
Myotis septentrionalis	Northern Long-eared Bat	Threatened
Mustela nigripes	Black-footed Ferret	Endangered
Lontra canadensis	Northern River Otter	Threatened
Vulpes velox	Swift Fox	Threatened
Cinclus mexicanus	American Dipper	Threatened
Sternula antillarum athalassos	Interior Least Tern	Endangered
Pandion haliaetus	Osprey	Threatened
Falco peregrinus	Peregrine Falcon	Endangered
Grus americana	Whooping Crane	Endangered
Macrhybopsis gelida	Sturgeon Chub	Threatened
Catostomus catostomus	Longnose Sucker	Threatened

[1] Listed as a species that may occur in Pennington County according to the State and Federally Listed Threatened, Endangered and Candidate Species Documented in South Dakota by County (updated on 07/19/2016) (https://gfp.sd.gov/userdocs/docs/ThreatenedCountyList.pdf).

9.3.5.2 Impacts to State-listed Species

Based on SDGFP's review of the SDNHD, no state-listed species have been documented within the Land Control Area (see Appendix A – Agency Correspondence). Per Section 9.3.3, Wild Springs does not anticipate impacts on whooping crane, Interior least tern, or NLEB. Given the limited open water in the Land Control Area, no impacts on state-listed species that use water are expected, including northern river otter, American dipper, Interior least tern, osprey, sturgeon chub, or longnose sucker. Similarly, based on the absence of cliff ledges and few trees in the Land Control Area, impacts on peregrine falcons are also not anticipated. Swift fox and black-footed ferret may be associated with prairie dog colonies; however, per the mitigation outlined in Section 9.3.2, Wild Springs re-designed the layout to avoid the 2019 mapped extent of the colonies and committed to fencing and vegetation management to try to minimize the expansion of the colonies. Overall, Wild Springs does not anticipate impacts to state-listed species.

9.3.5.3 Mitigation Measures for State-listed Species

Conservation measures outlined above for wildlife would also apply to state-listed species in the Land Control Area. No species-specific conservation measures are currently proposed for the state-listed species because no impacts are anticipated.

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

9.4.1 Existing Aquatic Ecosystem

As discussed in Section 9.2.1.3, all streams in the Land Control Area are intermittent, and the majority of wetlands described in Section 9.2.1.4 are emergent wetlands that are only temporarily or seasonally flooded; therefore, potential fishery habitat is limited (Figure 11 – Waterbodies, Wetlands, and Floodplains). No lake habitat exists within the Land Control Area.

9.4.2 Impacts to Aquatic Ecosystems

Wild Springs does not anticipate impacts to aquatic ecosystems. Intermittent waterbodies would not provide sustainable aquatic habitat as they only provide seasonal water flow. Similarly, emergent wetlands found in the Preliminary Development Area are generally shallow and likely freeze during the winter, causing winterkill of some aquatic species.

9.4.3 Mitigation Measures to Aquatic Ecosystems

The mitigation measures described in Section 9.2.3 for waterbodies and wetlands would also serve to avoid and minimize impacts to aquatic species and their habitat.

9.5 Land Use (ARSD 20:10:22:11, 20:10:22:18)

9.5.1 Land Use and Ownership

9.5.1.1 Existing Land Use and Ownership

The Land Control Area is private land. Several existing transmission lines that tie into the WAPA substation cross the Land Control Area. Additionally, an existing railroad line runs along the northern boundary of the Land Control Area and Garrett Road, 161st Avenue, and 230th Street bisect portions of the Land Control Area.

The Land Control Area is located within the General and Limited Agricultural Zoning Districts in Pennington County. Per the Pennington County zoning ordinance, a USES requires a CUP and must meet the requirements established in Section 317, Items 7-15 of the zoning ordinance (Pennington County, 2019). In addition, if the USES is within a State Flood Hazard Area (SFHA), the Pennington County Flood Damage Prevention Ordinance must be followed. These requirements are described in Section 8.0. Wild Springs will comply with the zoning requirements to ensure the Project is compatible with the General and Limited Agricultural District zoning regulations.

According to the USGS National Land Cover Database (MRLC, 2016), land cover in the Land Control Area is predominantly herbaceous (75.5 percent) or cultivated crops (21.4 percent); Table 9.5-1 and Figure 12 – Land Use provide details about all land cover types in the Land Control Area. Site visits and field studies confirm some of the land categorized as herbaceous in the NLCD data is actively grazed pasture; though most of these areas are highly fragmented by fences and existing transmission lines and roadways, which limits the available grazing areas to noncontiguous parcels of 80 acres or less (see Section 9.3.1 for additional information on vegetation types in the Land Control Area). Available grassland data does not differentiate between broken or unbroken, so all grasslands are shown. Areas categorized as developed (all types) by the NLCD data are primarily associated with roads bisecting the Land Control Area, the developed area around the WAPA substation, and the existing transmission lines throughout the area. In addition, the Rapid City, Pierre & Eastern Railroad runs parallel to the northern boundary of the Land Control Area.

The NLCD data indicates that less than one percent of the Land Control Area is wetlands; however, field surveys for the Project identified a greater number of wetlands in the Land Control Area than is indicated by the NLCD data presented in Table 9.5-1 (see Figure 11 – Waterbodies, Wetlands, and Floodplains). Natural vegetation communities, including herbaceous lands, are described in Section 9.3.1.1, and waterbodies (e.g., open water ponds) and wetlands are described in Sections 9.2.1.3 and 9.2.1.4, respectively. These land cover types will not be further discussed in this section.

Table 9.5-1 Summary of Land Use in the Land Control Area

NLCD Category	Field Observations	Total Acres	Percent of Total
Cultivated Crops	Alfalfa, hay, and wheat	320.7	21.4
Open Water	Delineated wetland	1.3	0.1
Emergent Herbaceous Wetlands	Delineated wetland	0.4	< 0.1
Herbaceous	Includes pasture, hay, and fallow grassland areas	1,130.8	75.5
Barren Land	Associated with the WAPA substation – gravel pad	6.0	0.4
Shrub/Scrub	Associated with the WAPA substation – no shrubs observed	1.5	0.1
Developed, All Categories	Generally, roads bisecting the Land Control Area	37.9	2.5
	Total	**1,498.6**	**100**

Source: MRLC, 2016

According to the 2017 Census of Agriculture, in Pennington County both the number and average size of farms increased by 10 percent and 7 percent, respectively, from 2012 to 2017. This is in contrast to the state as a whole; between 2012 and 2017, the number of farms in South Dakota decreased by 6 percent, while the average size of farms remained relatively stable (USDA, 2017). The top crops grown in Pennington County (in acres) include forage (hay, haylage, grass silage, and greenchop), followed by wheat (predominantly winter wheat), corn, and sunflowers. As noted

above, much of the land cover within the Land Control Area categorized by the NLCD data as herbaceous is used for livestock grazing (i.e., pasture land). Cattle is the top livestock raised in Pennington County (USDA, 2017), and both forage crops and pasture land support cattle and other livestock operations in the area.

There are no irrigated lands (center-pivot), major industries, or areas zoned for residential or commercial land uses in the Land Control Area. There are no residences or farmsteads within the Land Control Area. The nearest residence is 147 feet from the Land Control Area and 178 feet from the solar arrays within the Preliminary Development Area (see the Site Plan in Appendix B). The nearest residence to the Project substation is approximately 0.4 mile away. A discussion of potential impacts on noise-sensitive land uses (e.g., residences) is presented in Section 9.5.4 and a discussion of potential visual impacts on residences is presented in Section 9.5.5. A discussion of commercial and industrial land uses and public water supplies and utilities is presented in Section 9.7.2. In addition, there are no cemeteries, places of historical significance, or other public facilities adjacent to or abutting the Land Control Area.

9.5.1.2 Land Use Impacts

With the exception of the WAPA substation parcel, all Project impacts are on private land. The Project will not impact publicly owned land or the existing transmission line rights-of-way present within the Land Control and Preliminary Development Areas. Table 9.5-2 provides the total impacts on existing land uses within the Preliminary Development Area based on the preliminary design. No open water, emergent herbaceous wetlands, or barren land is within the Preliminary Development Area; therefore, these NLCD categories are not included in Table 9.5-2.

Table 9.5-2 Summary of Land Use Impacts Within the Preliminary Development Area

NLCD Category	Preliminary Development Area (acres)	Percentage of Total (acres)
Cultivated Crops	288.8	26.1
Herbaceous	815.1	73.6
Shrub/Scrub	0.4	< 0.1
Developed, All Categories	3.8	0.3
Project Total	**1,108.1**	**100**

Source: MRLC, 2016

Based on the preliminary design, Project construction would impact a total of 288.8 acres of cultivated cropland within the Preliminary Development Area, and remove these lands from production for the life of the Project (Table 9.5-2). Impacts on cultivated cropland will not result in a significant impact on land uses in the Project vicinity, as this acreage constitutes less than 0.1 percent of the available cropland (207,236 acres) in Pennington County, according to the USDA 2017 Census of Agriculture. Use of the land in the area within the Land Control Area but outside the fence of the developed area would be allowed to continue during construction and operation of the Project. In addition, agricultural production would continue in the surrounding areas during construction and operation of the Project.

Based on the preliminary design, construction of the Project would impact 815.1 acres of herbaceous land within the Preliminary Development Area. Based on review of NLCD data

(2016), no land classified as pasture/hay land is present within the Land Control or Preliminary Development Areas. However, site visits and field studies for the Project confirm some of the herbaceous land in the Land Control Area is actively grazed; therefore, impacts on herbaceous land may result in a reduction of available grazing land for livestock during the life of the Project. However, even if all herbaceous land within the Preliminary Development Area was considered as potential grazing land, the total impacts on herbaceous land within the Preliminary Development Area would constitute less than 0.1 percent of all land categorized as permanent pasture or rangeland in Pennington County (920,523 acres), according to the USDA 2017 Census of Agriculture. A reduction of less than 0.1 percent of available grazing land in Pennington County would have a minimal impact on the amount of available grazing land in the county.

Based on the preliminary design, construction of the Project would also impact 3.8 acres of developed land 0.4 acres of shrub/scrub land within the Preliminary Development Area.

There are no occupied residences within the Land Control Area. As designed, construction of the proposed Project will not cause displacement of residences or businesses.

9.5.1.3 Mitigation Measures for Land Use

The Project has been designed to be compatible with the South Dakota PUC siting requirements and the zoning requirements in Pennington County. Wild Springs will submit its application for a CUP to Pennington County in the second quarter of 2020 and will continue to coordinate with the county through the permitting process.

During construction and operation of the Project, the portion of the Preliminary Development Area that is located on cultivated cropland and herbaceous lands currently used for livestock grazing would be removed from productivity and use. Agricultural production would be allowed to continue in the area within the Land Control Area but outside the fence of the developed area during construction and operation of the Project. Wild Springs will install fencing around the Preliminary Development Area to prevent livestock from entering the solar facility during construction or operation. Wild Springs will work with landowners on the following issues: installation of gates and cattle guards where access roads cross existing fencelines, access control, signing of open range areas, and traffic management (e.g., vehicle speed management). Additionally, the following BMPs will be used:

- 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 cultivated cropland used for traffic or vehicle parking—segregating topsoil from excavated rock and subsoil—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.

Wild Springs will revegetate the disturbed area using a seed mix that includes recommendations provided by the NRCS and a cover crop. Approximately 96 percent of the land in the Preliminary

Development Area will be restored as open, herbaceous (i.e., within the racking area) rangeland cover (1,060.8 acres). This will stabilize and protect soils during operation of the Project. Only 4 percent (47.3 acres) will be converted to developed land with impervious surfaces (i.e., the substation and O&M building, inverter skids, parking areas, and access roads). All areas within the Land Control Area but outside of the area disturbed during construction will also be restored to pre-construction contours and characteristics to the extent practicable. These measures will allow the Project's land surfaces to drain properly, blend with the natural terrain, re-vegetate, and avoid erosion.

9.5.2 Recreation

9.5.2.1 Existing Recreation

Recreational opportunities in Pennington County include hunting, biking, hiking, boating, fishing, camping, swimming, horseback riding, cross country skiing, snowmobiling, and nature viewing; with many of these recreational opportunities being associated with the Black Hills National Forest in the western half of the county. The New Underwood Dam, located approximately 0.8 mile north of the Land Control Area, is a Game Production Area (GPA) and managed fishery for several fish species, including black crappie, channel catfish, yellow perch, bluegill, and largemouth bass. The New Underwood Dam offers a public boat launch and shore fishing opportunities (SDGFP, undated).

The South Dakota Office of School and Public Lands manages over 750,000 acres of land in the State. These lands are available to the public for hunting and fishing. There are no School and Public Lands Parcels within the Land Control Area; the nearest School and Public Lands Parcel is located approximately 0.45 mile southeast of the Land Control Area.

Figure 13 – Public Lands and Recreation shows the locations of GPAs and School and Public Lands in the vicinity of the Land Control Area, which are all public lands open for hunting. There are no public or recreation lands in the Land Control Area.

9.5.2.2 Impacts to Recreation

The Project will avoid all publicly owned recreation lands including GPAs and School and Public Lands; therefore, no impacts on recreation lands will occur.

9.5.2.3 Mitigation Measures for Recreation

Because no impacts on recreation lands will occur as a result of construction or operation of the Project, no mitigation measures are proposed.

9.5.3 Noise

9.5.3.1 Existing Noise

Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A weighted decibel scale (dBA) is used to reflect the selective sensitivity of human hearing. This

scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that we do not hear as well, such as very high and very low frequencies. Common sound sources within an agricultural and/or rural environment include, but are not limited to, sound from farm equipment such as tractors and combines, sound generated from traffic on roadways, sounds from birds, and wind rustling through the vegetation.

Background noise in the vicinity of the Project facilities is typically a result of farming equipment/operations, wind, and vehicles. South Dakota has not adopted statewide noise standards and therefore noise restrictions for private activities are unregulated unless local standards exist. Pennington County has defined noise standards for the operation of USES. The adopted standard is set forth in the Zoning Ordinance for Pennington County and specifies that noise levels may not exceed 55 dBA, as measured at the closest property line at the time the Building Permit application is filed (317-A—7-h). For the noise analysis, the distance between the closest property line of a property with a residence and an array tracker is 35 feet; the closest distance of an inverter to the same property line is 274 feet. Residences are considered noise sensitive areas; residences in the vicinity of the Land Control Area are shown on Figure 4 – Preliminary Project Layout.

9.5.3.2 Impacts from Noise

A variety of construction-related equipment will be used at differing times and for various lengths of time. The majority of these activities would not occur at the same time. Wild Springs expects a maximum sound level during construction to range between 85 and 95 dBA at 50 feet for a short duration. Sound levels are expected to be quieter for areas where activities are occurring at distances greater than 50 feet from the facility.

During construction, noise will be emitted by the construction vehicles and equipment. The amount of noise will vary based on what type of construction is occurring at the Project on a given day. Construction associated noise will likely be perceptible at adjacent residences. Grading equipment, bobcats, and other construction equipment are anticipated to emit noise between 76-85 dBA at 50 feet (U.S. Department of Transportation [USDOT], 2017). Noise associated with these types of equipment will primarily occur during the initial site set up – grading and access road construction – which is expected to last approximately four weeks. Wild Springs anticipates pile driving of the rack supports to create the most noise measured at 101 dBA at 50 feet (USDOT, 2017). Installation of each rack support takes between 30 seconds to 2 minutes depending on the soil conditions; Wild Springs anticipates this activity will take approximately 10 weeks across the site. Finally, installation of the solar panels on the tracking would emit noise levels similar to general construction equipment described above. Typically, a forklift is used to place individual panels on the tracking rack system. The noise from any of these construction activities would dissipate with distance and be audible at varying decibels, depending on the locations of the equipment and receptor. Note that construction activities will be sequenced; site preparation may occur at a portion of the site while pile driving occurs at a different location. These noise impacts will be temporary and limited to daytime hours.

The main source of noise from the Project during operation will be from the inverter/transformer skids, which includes the air conditioners housed in each, and to a lesser extent from the main power transformer within the Project substation and rotation of the tracking system. Table 9.5-3 summarizes the anticipated distance to reach the most Pennington County noise standard (55 dBA)

from a range of inverters and trackers under consideration for use at the Project and the main power transformer.

Table 9.5-3 Inverter and Tracker Noise Levels

Facility Type	Equipment Model	Distance to 55 dBA
Inverter	Sungrow SG3150U-MV	52 feet
	TMEIC Solar Ware Ninja PVU-L0920GR	33 feet
	SMA Sunny Central SC-4200-UP	143 feet
Tracker	NexTracker Horizon	< 5 feet
	Soltec SF7	10 feet
Transformer	Main Power Transformer	23 feet

The results of noise modeling conducted by technology manufacturers outlined in Table 9.5-3 show that noise levels will be at 55 dBA between 52 and 143 feet from the inverter, depending on which model is selected. Similarly, noise levels will be at 55 dBA between 5 and 10 feet from the trackers, depending on which model is selected. As such, the Project has been designed to meet the Pennington County 55 dBA noise standard (at the closest parcel line), as the Project design incorporates the loudest potential inverter and tracker. The closest inverter to any parcel line, including those within the Land Control Area, is 150 feet. Similarly, the closest array tracker to an external parcel line is 30 feet. Lastly, the closest parcel line to the main power transformer at the Project substation is 59 feet.

Additionally, at 50 feet from the inverter, the sound level is 60 dBA. The closest residence to an inverter is 582 feet. Using a logarithmic equation commonly used for calculating sound levels at varying distances, sound levels from the inverter at this residence are anticipated to be 38.6 dBA (Harris, 1991).

9.5.3.3 Mitigation Measures for Noise

Since sound levels are anticipated to be well below 55 dBA at the closest property line with a residence, Wild Springs does not anticipate that noise mitigation will be necessary. Additionally, during construction, Wild Springs plans to limit construction to daylight hours. No noise impacts are anticipated during operation; therefore, no mitigation measures are proposed.

9.5.4 Visual Resources

9.5.4.1 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.

The topography of the Land Control Area is undulating with elevations ranging from 2840 to 3020 feet above sea level. As discussed in Section 9.5.1, land use within the Land Control Area is predominantly agricultural, with grazing and cultivated crops. Grazing pastures are generally approximately 80-acres fenced to facilitate pasture rotations. The existing New Underwood

Substation is located within the Land Control Area. Additionally, there are six WAPA transmission lines that enter/exit the New Underwood Substation and bisect the Land Control Area (see Figure 12 – Land Use). Three of the transmission lines run east-west through the Land Control Area west of 161st Avenue and are spaced at half mile intervals. These transmission lines have wooden H-frame structures approximately 80 feet in height. The other three transmission lines run predominately north-south from the New Underwood Substation, primarily on the WAPA parcel within the Land Control Area and are wooden H-frame or metal lattice structures approximately 130 feet in height. Finally, there is a telecommunication tower adjacent to the New Underwood Substation on the WAPA parcel. The transmission lines, substation, and communication tower are the current man-made focal points around the Land Control Area.

There are no residences or businesses within the Land Control Area; there are six residences and several agricultural buildings on parcels adjacent to the Land Control Area (see Figure 12 – Land Use). The closest residence to the Land Control Area is 147 feet east of the northwestern portion of the Land Control Area along Garret Road. This residence is within the New Underwood municipal boundary, which abuts the Land Control Area. There are additional residences along each of the three roads that bisect the Land Control Area (see Figure 12 – Land Use).

9.5.4.2 Impacts to Visual Resources

Visual impacts are defined as the human response to visual contrasts resulting from introduction of elements into a viewshed. 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 will convert approximately 1,103.9 acres of herbaceous land and cultivated crops (see Table 9.5-2 in Section 9.5.1.2 and associated discussion) to a solar facility characterized by complex geometric forms, lines, and surfaces that may be divergent from the surrounding rural landscape. Most of the disturbed area will host rows of solar PV panels. Solar PV employs glass panels that are designed to maximize absorption and minimize reflection to increase electricity production efficiency. The images in Section 4.2.1 provide a reference for how the Project will appear during operation. To limit reflection, solar PV panels are constructed of dark, light-absorbing materials and covered with an anti-reflective coating. Today's panels reflect as little as two percent of the incoming sunlight depending on the angle of the sun and assuming use of anti-reflective coatings, which will be utilized for the Project.

The solar arrays will occupy most of the disturbed area for the solar facility. The electrical transformers and inverters, a substation and O&M building, and access roads will utilize the rest of the disturbed area. Most of the facility, including the solar arrays, will be low-profile, up to 20 feet in height compared to the many existing transmission structures ranging in height from approximately 80 to 130 feet tall. The Project substation will be of similar vertical profile as the existing New Underwood Substation within the Land Control Area.

The solar arrays will be visible from adjacent roadways and parcels but given their relative low profile they will not be visible from long distances like taller structures would be. Wild Springs has coordinated with Project participants and sent mailings to adjacent landowners to inform them of the Project. Wild Springs is committed to working with adjacent landowners to provide vegetative screening where appropriate. The closest residence to the preliminary design is

approximately 147 feet to the east of the Preliminary Development Area. Wild Springs is in the process of coordinating with this landowner regarding vegetative screening and currently plans to implement approximately 940 feet of vegetative screening between the residence and the Project facilities. In coordination with this resident, the vegetative screening will be placed outside the security fence, possibly on the landowner's property. The type of vegetation has not yet been determined and will be done so through coordination with the landowner and Pennington the Pennington County Conservation District to ensure the vegetation will be well-suited for the climate and soil conditions. The vegetative screening is shown on Figures 4 and 5a-d – Preliminary Project Layout and on the Site Plan in Appendix B.

Wild Springs has completed several visual renderings from various locations in the Land Control Area (see Appendix I – Visual Renderings). The renderings include the one area on the west side of the Land Control Area for which there will be solar panels on both sides of Garrett Road, a rendering near the closest residence, a rendering near the WAPA substation, and renderings from New Underwood.

9.5.4.3 Mitigation Measures for Visual Resources

The Applicant has incorporated setback requirements into the design of the Project to minimize visual impacts (refer to Table 8-1 - Utility-Scale Solar Energy System Setback Requirements). Wild Springs has addressed aesthetics through vegetative screening and design. Only one portion of the Project will have solar facilities on both sides of a road. Additionally, the combination of topography in the area and low-profile arrays is such that the Project will not be seen from long distances. Furthermore, the Land Control Area is situated in an existing environment characterized by several high voltage transmission lines and roads, a substation, a communication tower, and rural residences.

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

9.6.1 Existing Air Quality

In accordance with EPA requirements, the SDDENR operates an ambient air monitoring network of samplers. The nearest monitoring location to the Project is in Rapid City, Pennington County, approximately 11 miles west of the Land Control Area (SDDENR, 2016). The primary emission sources that exist within the Land Control Area include agriculture equipment, and vehicle use along nearby Interstate 90.

9.6.2 Air Quality Impacts

Construction activities could release air emissions of criteria pollutants, volatile organic compounds, greenhouse gas emissions (e.g., carbon dioxide), and small amounts of hazardous air pollutants. During construction of the Project, fugitive dust emissions would temporarily increase due to truck and equipment traffic in the Project. Additionally, there would be short-term emissions from diesel trucks and construction equipment. Air quality effects caused by dust would be short term, limited to the time of construction or decommissioning, and would not result in National Ambient Air Quality Standards exceedances or significantly contribute to greenhouse gas emissions.

There would be no direct air emissions from operation of the Project because no fossil fuels are combusted. Negligible amounts of dust, vehicle exhaust emissions, and combustion-related emissions from diesel emergency generators would occur during maintenance activities. These emissions would not cause exceedances of air quality standards. Operation of the Project and interconnection substation 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 would be negligible. The Project interconnection substation would employ sulfur hexafluoride-filled circuit breakers. Sulfur hexafluoride is a greenhouse gas, and therefore, equipment leaks could contribute to air quality impacts.

9.6.3 Mitigation Measures for Air Quality

If wind erosion becomes an issue during construction, standard industry practices may be implemented, including mulching exposed soils, wetting exposed soils, and maintaining vegetative cover (both cover crops and permanent vegetation). As necessary, dust from construction traffic will likewise be controlled using standard construction practices such as watering of exposed surfaces, covering of disturbed areas, and reduced speed limits. Overall, dust emissions currently experienced annually in the area through farming activities will be reduced for the life of the Project through the establishment of perennial vegetative cover.

Emissions from construction vehicles will be minimized by keeping construction equipment in good working order. As stated in Table 4.6-1, Wild Springs' O&M staff will also conduct monthly visual inspections of the Project substation to detect and properly address any equipment leaks.

9.7 Community Impact (ARSD 20:10:22:23, 20:10:22:24)

9.7.1 Socioeconomics

9.7.1.1 Existing Socioeconomic Resources

Socioeconomic information provided herein is based on data from the U.S. Census Bureau's QuickFacts and Explore Census Data websites. Data is provided at the county level to characterize the socioeconomic environment in the Land Control Area and at the state level for the purpose of comparison. As described in Section 4.1, in this portion of South Dakota, public land survey townships do not always have a single corresponding civil township; in some cases, multiple public land survey townships are within a single unorganized territory. The Land Control Area is located within the Rapid City East and East Central Pennington Unorganized Territories; civil township data is not available for the Land Control Area. Census data is not available for the Rapid City East and East Central Pennington Unorganized Territories. Furthermore, comparable census data about income, poverty, and unemployment is not available for towns and cities with a population of less than 5,000 persons. Socioeconomic information is summarized in Table 9.7-1.

According to the 2010 Census data, the total population of Pennington County represents about 12 percent of the total population of South Dakota. The largest city in Pennington County is Rapid City, which represents about 67 percent of the total population of the county; Rapid City is approximately 13 miles west of the Land Control Area for the Project. When compared to 2018

population estimates, the total population in South Dakota increased by 8.4 percent between 2010 and 2018. Similarly, 2018 population estimates show that the population in Pennington County increased by 10.7 percent since the 2010 census (U.S. Census Bureau, 2019).

The per capita income in Pennington County between 2014 and 2018 was $30,518, which is similar to the state level (U.S. Census Bureau, 2019). The unemployment rate in Pennington County is similar to the state level, at 3.8 percent and 3.5 percent, respectively. Approximately 13.3 percent of the people in Pennington County are reported living at or below the poverty level, which is similar to the state level of 13.1 percent.

According to the 2018: American Community Survey 5-year Estimates, approximately 4,553 vacant housing units exist in Pennington County. In the nearest metropolitan area, Rapid City, South Dakota, there are approximately 2,427 vacant housing units (U.S. Census Bureau, 2018a). In addition, according to the website Visitrapidcity.com (visitrapidcity.com, Undated), approximately 49 hotels and motels, three bed and breakfasts, and four campgrounds are available in the greater Rapid City area. These residence and temporary housing statistics suggest the local area could support an influx of construction workers, if needed.

Table 9.7-1 Existing Socioeconomic Environment in the Project Vicinity

	Population, Census, April 1, 2010[1]	ACS Population Estimates July 1, 2018[1]	Percent Change 2010 - 2018[1]	2018 Estimated Total Housing Units[2]	2018 Estimated Total Vacant Housing Units[2]	Per Capita Income 2014-2018 (U.S. 2018 Dollars)[1]	Unemployment Rate (%)[3]	Persons Living Below the Poverty Level (%)[1]
South Dakota	**814,180**	**882,235**	**8.4**	**387,637**	**46,072**	**29,801**	**3.5**	**13.1**
Pennington County	100,948	111,729	10.7	48,151	4,553	30,518	3.8	13.3

[1] U.S. Census Bureau, 2019
[2] U.S. Census Bureau, 2018b
[3] U.S. Census Bureau, 2018c

9.7.1.2 Socioeconomic Impacts

The Project is designed to be socioeconomically beneficial to the landowners, local governments, and communities. As noted in Section 2.2.1, energy produced by the Project will provide significant, numerous, and varied socioeconomic benefits, including reducing energy costs to consumers and generating well-paying jobs.

The Project will also provide a supplementary source of income for the rural landowners and farmers on whose land the Project will be sited. Landowner compensation is established by voluntary lease agreements between the landowners and Wild Springs for lease of the land. Wild Springs will also establish the Wild Springs Education Fund, to which Wild Springs will contribute $25,000 annually (calculated at $200 per installed MW) for the first 20 years of Project operation. Because the Project is located within the New Underwood school district, the fund will be distributed to this district. Wild Springs will continue to coordinate with the school district on establishing the fund as the Project develops. The economic impacts on communities presented in this Application are based on a total Project output of up to 128 MW. Table 9.7-2 provides a breakdown of the estimated economic impacts over the life of the Project.

Table 9.7-2 Estimated Direct Economic Impact Over 20 Years of Operation

Category	Average Yearly Economic Impact (in U.S. Dollars)	20-year Economic Impact (in U.S. Dollars)
Employee Wages	$280,000	$5,600,000
Alternative Annual Tax	$600,000	$12,000,000
Education Fund	$25,000	$500,000
Total Economic Benefit	$900,000	$18,000,000

Construction of the Project would provide temporary increases in revenue through increased demand for lodging, food services, fuel, transportation and general supplies. The Project will also create new local job opportunities for various trade professionals that live and work in the area and it is typical to advertise locally to fill required construction positions. Opportunity exists for sub-contracting to local contractors for gravel, fill, and civil work. Additional personal income will also be generated by circulation and recirculation of dollars paid out by the Project as business expenditures and state and local taxes.

Construction crews would include a variety of skilled and unskilled laborers. This diverse workforce would include construction management, safety supervision, quality supervision, civil contractor, foundation and racking installer, fencing contractor, electricians and others. Construction of the Project is anticipated to generate over 150 jobs at peak construction. These numbers are estimates and will vary from the projections based on actual Project need. Wild Springs estimates labor costs of approximately $25 million and include hourly wages, contractors, subcontractors plus other employer costs, including but not limited to, health benefits, workers compensation, disability insurance, and social security. Table 9.7-2 provides a breakdown of the estimated direct economic impacts over the first 20 years of the project.

General skilled labor is expected to be available in Pennington County or South Dakota to serve the Project's basic infrastructure and site development needs. Specialized labor will be required

for certain aspects of the Project. It may be necessary to import specialized labor from other areas of South Dakota or neighboring states because the relatively short construction duration often precludes special training of local or regional labor. Much of the workforce needed to construct a solar facility must be comprised of electricians licensed in South Dakota because most of the assembly and wiring work for solar installations is considered electrical work under the South Dakota state electrical code.

Effects on temporary or permanent housing are anticipated to be negligible. During construction, out-of-town laborers will likely use lodging facilities nearby. Unless the construction laborers already live in the vicinity of the Project, it is not anticipated they will remain after Project construction is completed. The operations and maintenance of the facility will require approximately four full time personnel with one plant manager and the remaining three positions being technicians. These full-time staff are expected to live in the vicinity of the Project. The Project anticipates that sufficient temporary lodging and permanent housing will be available within Pennington County, and within the Rapid City metropolitan area, to accommodate construction laborers and long-term personnel.

Wages paid to long-term personnel are estimated to start at $250,000 per year plus about 30-40% in benefits. The average wages paid are expected to increase slightly over time averaging approximately $270,000 per year for the first 10 years, and averaging approximately $280,000 per year for the first 20 years. The wages are expected to total approximately $2.7 million over the first full ten years of commercial operation, and about $5.6 million over the first 20-years of operation. The project anticipates the need for a total of 4 employees for the project site. These operational jobs include a plant manager and three solar technicians. Plant manager wages range from $70,000 to $100,000 per year plus benefits and solar technician wages range from $60,000 to $80,000 per year plus benefits.

Wages will be paid and expenditures will be made to local businesses and landowners during construction and operation of the Project. In addition, lease payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.

Regarding potential impacts to land values, numerous studies have concluded that properties adjacent to solar projects do not see negative property-value impacts, nor does having a solar project as a neighbor negatively impact the ability to sell agricultural or residential properties (Solar Energy Industries Association, 2019). For example, a paired-sales study of the sale of properties adjacent to nine solar farms in Minnesota, Illinois, and Indiana found “little to no measurable and consistent difference in value” between sales of properties adjacent to solar farms and control properties (McGarr and Lines, 2018). This finding led the authors to conclude that “properties surrounding other solar farms operating in compliance with all regulatory standards will similarly not be adversely affected, in either the short or long term periods.”

Operation of the Project will have long-term beneficial impacts to the state and local tax base and to the local economy in this area of South Dakota. In addition to the creation of jobs and personal income, the Project will pay Alternative Annual Taxes which will benefit the State of South Dakota, school districts, and Pennington County.

Alternative Annual Tax

In the South Dakota, solar energy facilities are subject to an alternative annual tax based on nameplate capacity (SDCL Chapter 10-35 [18]). This alternative annual tax is, "…in lieu of all taxes levied by the state, counties, municipalities, school districts, or other political subdivisions of the state on the personal and real property of the company which is used or intended for use as a renewable facility…" (SDCL Chapter 10-35 [17]). The annual tax is calculated by multiplying $3 by the nameplate capacity of the facility (SDCL Chapter 10-35 [18]). The electricity generated by solar facilities is further subject to an annual tax of $.00090 per kilowatt hour of electricity produced (SDCL Chapter 10-35 [19.1]). These tax revenues are compiled into the renewable facility tax fund, pursuant to SDCL Chapter 10-35 [20]. All of the nameplate capacity tax revenue and 20 percent of the production tax revenue in the renewable facility tax fund are distributed as follows (SDCL Chapter 10-35 [21]):

- 50 percent to the school district where the solar facility is located
- 15 percent to the county auditor by township where the facility is located
- 35 percent to the county

If the solar facility is sited in an unorganized township, that portion of the tax revenue is allocated to the county. Table 9.7-3 presents the projected Alternative Annual Tax revenue distribution to the state, Pennington County, and school district as a result of the Project.

Table 9.7-3 Projected Annual Tax Revenue Distribution

Category	Estimated Annual Tax Revenue (in U.S. Dollars)	20-year Tax Revenue (in U.S. Dollars)
State	180,000	3.6 million
County[1]	210,000	4.2 million
School District[2]	210,000	4.2 million
Total Tax Revenue	**600,000**	**12 million**

[1] Because the Project is located within unorganized territories, instead of civil townships, the share of tax revenue that would typically be distributed to the townships is distributed to the county.

[2] State and local impact to schools determined by state law.

The estimates in Table 9.7-3 are based on Wild Springs operating 128 MWs of nameplate capacity and an energy production profile designed by Wild Springs's experienced development team. The actual amount paid will be based on current law and actual energy production of the year in question. In particular, state law specifies how the school district's portion of tax revenue is treated in the State's school funding formula. Currently, one hundred percent of the School District taxes are allocated to the local school district; however, these taxes are counted as 'local effort' in the State's school funding formula and this impacts/reduces the amount of state funding the school district receives. The allocation of this or other taxes could change over time based on state law.

9.7.1.3 Mitigation Measures for Socioeconomic Impacts

In general, the socioeconomic impacts associated with the Project will be positive; therefore, no mitigative measures are proposed.

9.7.2 Community Facilities and Services

9.7.2.1 Existing Community Facilities and Services

This section describes the public services and infrastructure within the Land Control Area and impacts this Project may have on community facilities and public services. The nearest municipality, New Underwood, is within the New Underwood School District 51-3. However, the Land Control Area does not cross the municipal boundary of New Underwood and, as such, no schools, or other government facilities are located within the Land Control Area.

Public services are those typically provided by a government entity to its citizens and those services are used to benefit public health and safety. These services can include emergency services, potable water, sanitary systems, and utilities. Most rural residences in Pennington County are supplied water by wells (see Section 9.2.1.5). Sewage is serviced by residential septic tanks and/or drain fields. There are several telephone and fixed residential broadband providers that provide service to the area surrounding New Underwood including Golden West Telecommunications Cooperative, Inc., Western Communications, Inc., and VSAT Systems, Inc. (Federal Communications Commission, 2020).

The Project is located adjacent to the existing New Underwood Substation, a WAPA-owned facility. As mentioned in Section 9.5.1.1, several existing transmission lines that tie into the New Underwood Substation cross the Land Control Area. Approximate locations of these transmission lines are displayed on Figure 12 – Land Use. There are no pipelines in the Land Control Area (Pipeline and Hazardous Materials Safety Association, 2020).

The Project is in rural Pennington County, South Dakota, which according to the 2010 U.S. Census, has a population density of 36.4 persons per square mile of land area (U.S. Census Bureau, 2010). If emergency personnel were needed at the Project, multiple agencies would likely respond, depending on the situation. These include the Pennington County Sheriff and the New Underwood volunteer fire department. If needed, additional volunteer fire departments from Box Elder and Rapid Valley, located approximately 8.5 miles and 12.0 miles west of the Project, respectively, may assist. Ambulance service is provided by the Rapid City Fire Department, and the nearest hospital is the Rapid City Regional Hospital in Rapid City, approximately 13 miles west of the Project.

9.7.2.2 Impacts to Community Facilities and Services

Wild Springs will coordinate with South Dakota One Call (SD811.com) before and during construction to fully understand infrastructure locations and safety concerns and to avoid possible structural conflicts. Wild Springs will also conduct an American Land Title Association survey to identify the locations of underground utilities. Final design will minimize and avoid impacts to underground utilities; if conflicts are unavoidable, Wild Springs will coordinate with the utility to

develop an approach to reroute or otherwise protect the utility. Underground utilities will be marked prior to construction start.

As described in Section 1.1, the Project will interconnect into the existing New Underwood Substation via a 115 kV transmission line of less than one mile. The Project will not impact existing transmission lines. During interconnection, customers may experience short outages when the WAPA Substation is shut down and temporary service is being established. The timing and duration of any service interruptions would be determined and communicated by the interconnecting utility (WAPA).

Construction and operation of the Project will have minimal impacts on the security and safety of the local populace. Wild Springs is gathering information to coordinate with emergency and non-emergency response teams for the Project, including law enforcement agencies (Pennington County Sheriff, Rapid City Fire Department, and New Underwood, Box Elder and Rapid Valley volunteer fire departments) and 911 services. The type and number of responding agencies will depend on the incident requiring emergency services.

9.7.2.3 Mitigation Measures for Impacts to Community Facilities and Services

No impacts on public services or public utilities are anticipated; therefore, no mitigation measures are proposed. The short-term construction force will have a minimal to negligible effect on industry, housing, local labor market, regional health facilities, public infrastructure (water and sewer systems), solid waste facilities, schools, fire protection, law enforcement, or other community, government, or recreational facilities.

Wild Springs will develop an Operations and Emergency Action Plan that outlines local contacts (first responders and internal operation and maintenance staff) and emergency procedures for evacuation, fire response, extreme weather, injury, and criminal behavior. Additionally, construction will comply with local, state, and federal regulations regarding installation of the Project facilities and standard construction practices. Established industry safety procedures will be followed during and after construction of the Project; these include clear signage during all construction activities, and fencing of all Project facilities to prevent public access.

9.7.3 Commercial, Industrial, and Agricultural Sectors

9.7.3.1 Existing Commercial, Industrial, and Agricultural Sectors

The primary focus of land use in the Land Control Area is agricultural production, predominantly livestock production (USDA, 2017). No commercial, industrial, mining, or institutional land uses are located within the Land Control Area. According to the USDA's 2017 Census of Agriculture, 656 farms were operating in Pennington County in 2017, encompassing a total of 1,146,586 acres (64 percent of the total acres in Pennington County), with an average farm size of 1,748 acres. The total market value of agricultural products sold was $60.4 million, with 72 percent attributed to livestock, poultry and their products and 28 percent attributed to crops, including nursery and greenhouse crops (USDA, 2017). The top livestock inventory (by farms) was cattle and calves (360 farms) followed, distantly, by layers (i.e., poultry; 78 farms). The top crops (in acres) include

forage (hay, haylage, grass silage, and greenchop), followed by wheat (predominantly winter wheat), corn, and sunflowers.

9.7.3.2 Impacts to Commercial, Industrial, and Agricultural Sectors

Approximately 288.8 acres of existing cultivated cropland would be removed from crop and forage production by the proposed Project and approximately 815.1 acres of herbaceous land, much of which is used as pasture/rangeland, will also be converted to solar facilities. Agricultural activities, including livestock grazing, would be allowed to continue up to the fence line around the solar arrays and the edge of access roads during construction and operation of the Project. Wild Springs notes that landowners that currently utilize pasture areas for grazing have additional pastures outside the Land Control Area.

9.7.3.3 Mitigation Measures for Commercial, Industrial, and Agriculture Sectors

About 96 percent of the land in the disturbed area (estimated to be 1,060.8 acres) will be restored as open, herbaceous rangeland cover with the exception of the substation and O&M building, inverter skids, parking areas, and access roads which will be converted to developed land and impervious surfaces (47.3 acres). The revenue lost from removing land from agricultural production will be offset by the lease agreements with landowners. Additional mitigation measures for impacts on agricultural lands are described in Section 9.5.1.3.

9.7.4 Transportation

9.7.4.1 Existing Transportation

Ground Transportation

In general, the existing roadway infrastructure in and around the Land Control Area consists of county roads. Garret Road bisects the northwestern portion of the Land Control Area in an east-west direction, 161st Street bisects the central portion of the Land Control Area in a north-south direction, and 230th Street bisects the southeastern portion of the Land Control Area in an east-west direction. The Project is located less than a mile south of Interstate 90.

Aviation

Rapid City Regional Airport is located approximately ten miles southwest of the Land Control Area. This commercial airport hosts two runways: a concrete runway oriented northwest to southeast and a smaller asphalt runway oriented northeast to southwest. There are no other public airports in proximity to the Land Control Area (South Dakota Department of Transportation [SDDOT], 2020). Wild Springs has not identified any private airstrips within five miles of the Land Control Area.

Ellsworth Air Force Base

Ellsworth Air Force Base (Ellsworth) is located approximately 11.5 miles northwest of the Land Control Area and east of Rapid City. This military base houses nearly 11,000 military members,

family members, and civilian employees and is home to the 28th Bomb Wing (Ellsworth Air Force Base, 2017). Similar to Rapid City Regional Airport, Ellsworth also has a runway oriented northwest to southeast.

9.7.4.2 Impacts to Transportation

Ground Transportation

Access to the Project will be via existing county roads. Wild Springs will coordinate with Pennington County on anticipated road use and the need for improvements and driveway changes prior to construction. The roads used for access to the Wild Springs Solar Project are shown on Figure 4 (Preliminary Project Layout). During the construction phase, temporary impacts are anticipated on some public roads within the vicinity of Project facilities, primarily through additional traffic and slow-moving construction vehicles.

Construction traffic will use the existing county roadway system to access the Project facilities and deliver construction materials and personnel. Traffic during construction is estimated to be approximately on average 75-100 pickup trucks, cars, and/or other types of employee vehicles onsite for the majority of construction. It is estimated that approximately 10-20 semi-trucks per day will be used for delivery of facility components. Semi-truck delivery will vary per day depending on time of construction and delivery timeline of equipment. Overweight or oversized loads are unlikely. If they are required, Wild Springs will obtain the appropriate approvals. This increased traffic may be perceptible to area residents, but the slight increase in volume is not expected to affect traffic function. Slow-moving construction vehicles may also cause delays on smaller roads, similar to the impact of farm equipment during planting or harvest. However, these delays should be minimal for the relatively short construction delivery period.

After construction is complete, traffic impacts during the operations phase of the Project will be negligible. A small maintenance crew driving through the area in pickup trucks on a regular basis will monitor and maintain the facilities as needed, but traffic function will not be impacted as a result.

Aviation

Airports have protected three-dimensional airspaces for aircraft to safely approach the runways. Rapid City Regional Airport has both Class D Airspace (protected airspace around airports with an operating air traffic control tower) and Airspace Imaginary Surface (protected navigable airspace to prevent existing or proposed manmade objects from extending upward into navigable airspace). These protected airspaces are displayed in two dimensions (i.e., buffers around the airport, not horizonal above the ground surface) in the Pennington County Zoning Ordinance. The Land Control Area is situated outside Class D Airspace and Airspace Imaginary Surfaces associated with runways at Rapid City Regional Airport (Pennington County, 2019).

The South Dakota Aeronautics Commission has reviewed the Project and determined the "proposed solar project would not pose an obstruction hazard to any South Dakota airports" (see Appendix A – Agency Correspondence). Additionally, the Project has received "Determination of No Hazard" responses from the FAA for points along the perimeter of the Land Control Area (see

Appendix A – Agency Correspondence). Additionally, the FAA published an Interim Policy for Solar Projects at Airports on October 23, 2013. The policy clarifies the FAA's jurisdiction in reviewing solar projects and the standards it uses to determine if a project will result in a negative glare impact to airspace safety. Wild Springs conducted a Glare Analysis to assess potential glare for aircraft arriving and departing Rapid City Regional Airport. The analysis concluded the Wild Springs Solar Project will have no impacts on the airport's four runways or the air traffic control center (see Appendix J – Glare Analysis).

Ellsworth Air Force Base

Similar to Rapid City Regional Airport, the Land Control Area is sited outside both the Class D Airspace and Airspace Imaginary Surface associated with the runway at Ellsworth Air Force Base (Pennington County, 2019). Additionally, Wild Springs received confirmation from Ellsworth that the Project will not impact present or future missions (see Appendix A – Agency Correspondence). Lastly, similar to Rapid City Regional Airport, the Wild Springs Solar Project will not impact the Ellsworth Air Force Base two runways or air traffic control center (see Appendix J – Glare Analysis).

9.7.4.3 Mitigation Measures for Transportation

Ground Transportation

Due to the increased road use in the Land Control Area during construction, Wild Springs has consulted with Pennington County on road use and will continue to coordinate with the county prior to construction to ensure the safe and efficient use of roads and to minimize and mitigate the overall impact. 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.

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, and safety personnel on site.

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, operations and maintenance, and decommissioning phases, traffic will be restricted to designated Project or maintained public roads. Use of other unimproved roads will be restricted to emergency situations.

The cost estimate to repair roads back to preconstruction conditions is done as part of final engineering and will depend on the plans for road upgrades.

Aviation

As no impacts to air traffic are anticipated, no mitigation measures are proposed.

Ellsworth Air Force Base

As no impacts to Ellsworth are anticipated, no mitigation measures are proposed.

9.7.5 Cultural Resources

Cultural resources include archaeological and historic architectural resources that provide important information about the history of human occupation and alteration of the landscape over time. Archaeological resources include prehistoric and historic artifacts, structural ruins, or earthworks that are typically found either partially or completely below the ground surface. Historic architectural resources include standing structures, such as buildings and bridges, as well as historic districts and landscapes.

Cultural resources are finite and non-renewable; once destroyed cultural resources and the information they provide are lost. Federal and state laws and regulations provide the standards for cultural resources identification, evaluation, and mitigation of impacts. If a cultural resource site meets the criteria for listing on the National Register of Historic Places (NRHP), it is considered significant and termed an "historic property." The Land Control Area for the Project was designed to consider impacts to cultural sites that may be eligible for listing in the NRHP.

9.7.5.1 Existing Cultural Resources

Wild Springs hired Area M Consulting (Area M) to conduct a Level I Records Search of the Land Control Area, and an additional one-half mile radius around the Land Control Area. Area M conducted the background research in 2017 and 2019 to identify previously recorded archaeological and historic architectural resources and previous investigations. Following the background research, Area M conducted a Level III Inventory in 2017 and 2019 to identify any additional cultural resources that may be present within the Land Control Area. A summary of the results of these investigations is presented below.

Level I Records Search

Area M's Level I Records Search included review of documentation on file at the South Dakota Archaeological Research Center in Rapid City, as well as various historical maps (e.g., General Land Office maps, historic aerial photographs, and other publicly available records). The review identified seven previous investigations, two previously recorded archaeological sites, and four previously recorded historic architectural resources within one half mile of the Land Control Area. The results of the Level I Records Search are summarized below.

Table 9.7-4 summarizes the previously recorded archaeological sites identified during the Level I Records Search for the Project.

Table 9.7-4 Previously Recorded Archaeological Sites Within One-Half Mile of the Land Control Area

Site Number	Site Type	Cultural Affiliation	NRHP Eligibility	Proximity to Project
39PN2578	Foundation, depression, artifact scatter	Euro-American	Unevaluated	Within ½ mile of Land Control Area
39PN1976	Foundation	Euro-American	Not Eligible	Within ½ mile of Land Control Area

Both previously recorded archaeological sites are of Euro-American origin. Site 39PN2578 is remnants of a foundation with an associated depression and historic artifact scatter. The site was not evaluated for listing in the NRHP. Site 39PN1976 is another foundation remnant; this site was recommended as not eligible for NRHP listing. Both of these sites are located outside of the Land Control Area.

Table 9.7-5 summarizes the previously recorded historic architectural resources identified during the Level I Records Search for the Project. None of the previously recorded historic architectural resources are located within the Land Control Area for the Project.

Table 9.7-5 Previously Recorded Historic Architectural Resources Within One-Half Mile of the Land Control Area

State Historic Preservation Office ID	Property Category	NRHP Eligibility	Proximity to Project
PN00000672	Bridge	Not Eligible	Within ½ mile of Land Control Area
PN00000673	Bridge	Not Eligible	Within ½ mile of Land Control Area
PN00000341	Structure	Eligible	Within ½ mile of Land Control Area
PN00000344	Structure	Not Eligible	Within ½ mile of Land Control Area

Two of the previously recorded historic architectural resources are bridges; neither bridge is eligible for listing in the NRHP. The remaining two previously recorded historic architectural resources are structures located just outside of the municipal boundary of New Underwood. One of the structures is eligible for the NRHP and the second structure is not eligible.

Level III Cultural Resources Inventory

Area M conducted a Level III Cultural Resources Inventory of a 1,643-acre area, that fully encompasses the Land Control Area, in April and May 2017 and October and November 2019; the Level III work was completed for all acres considered for development as described in Section 7. The field inventory included systematic pedestrian survey along transects spaced 15 meters apart

in areas where ground visibility was greater than 30 percent. In areas where ground visibility was less than 30 percent but greater than 5 percent, pedestrian survey transects were between 10 to 5 meters apart. In areas where ground visibility was less than 5 percent, subsurface shovel testing was conducted. Ground visibility at the time of survey generally ranged from 10 to 100 percent, with only 1 percent of the surveyed area exhibiting ground visibility below 10 percent.

One previously unrecorded archaeological site was identified during pedestrian survey. Site 39PN3777 is a prehistoric artifact scatter, located within crop and pastureland adjacent to Boxelder Creek. The artifacts were found on the ground surface and shovel testing conducted at the site did not recover additional artifacts or evidence of subsurface deposits. Area M recommended the site be avoided and established a 50-foot buffer around the site boundary. Wild Springs adjusted the boundary of the Land Control Area to avoid Site 39PN3777 and establish a 50-foot buffer. No additional historic architectural resources were identified during the Level III field inventory. As such, Area M recommends that no historic properties will be affected by the Project.

Agency and Tribal Consultation

As noted in Section 1.4.2, WAPA's execution of an interconnection agreement with the Project constitutes a federal action. In accordance with its responsibilities under NEPA, WAPA must comply with Section 106 of the National Historic Preservation Act of 1966 and consider the effects of the Project on historic resources. Consultation with the South Dakota State Historic Preservation Office (SHPO) and federally recognized tribes with an interest in the Project area is a part of WAPA's responsibilities under Section 106.

To assist WAPA in meeting its obligations, Wild Springs submitted the final Level I and Level III Inventory Report for the Project to WAPA on January 2, 2020 After completing its review, WAPA submitted the Level I and Level III Inventory Report for the Project to the SHPO in March of 2020. In a letter dated April 21, 2020, the South Dakota SHPO concurred with Area M's recommendations that the Project would not affect historic properties listed in or eligible for listing in the NRHP. A copy of the South Dakota SHPO's letter is provided in Appendix A – Agency Correspondence.

WAPA also sent twelve tribes Project introduction letters on January 27, 2020 and the final Level I and Level III Inventory Report for the Project on May 8, 2020. One tribe expressed interest in learning more about the Project; WAPA is coordinating with this tribe.

9.7.5.2 Impacts to Cultural Resources

One NRHP-unevaluated archaeological site was identified within the Land Control Area during Level III field inventory. This site will be avoided by Project facilities and construction activities; therefore, the construction and operation of the Project will not impact historic properties listed in, eligible for, or potentially eligible for listing in the NRHP.

9.7.5.3 Mitigation Measures for Cultural Resources

The Project will avoid impacts to cultural resources. Before construction of the Project begins, Wild Springs will prepare an Unanticipated Discoveries Plan that will outline the steps to be taken if previously unrecorded cultural resources or human remains are encountered during construction.

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. Therefore, no significant impacts on cultural resources are anticipated from the Project.

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

Wild Springs does not have any current plans to add to or modify the Project. However, Wild Springs does request the micrositing flexibility discussed in Section 4.1.

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

11.1 Permits and Approvals (ARSD 20:10:22:05)

Wild Springs is responsible for undertaking all required environmental review and will obtain all permits and licenses that are required following issuance of the 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 11.1-1.

Table 11.1-1 Potential Permits and Approvals

Regulatory Authority	Permit/Approval	Status/Anticipated Completion
Federal Approvals		
Western Area Power Association (WAPA) in coordination with the United States Fish and Wildlife Service (USFWS), South Dakota State Historic Preservation Office (SHPO) and Tribal Historic Preservation Offices (THPOs)	ESA Section 7 Consultation on threatened and endangered species	4th Quarter 2020
	National Environmental Policy Act review and preparation of Environmental Assessment	4th Quarter 2020
	National Historic Preservation Act Section 106 Review (Class I Literature Review / Class III Cultural Field Study)	Section 106 Review anticipated completion in the 4th Quarter 2020. Class I and III studies are complete.
U.S. Army Corps of Engineers	Jurisdictional Determination	Complete
	Section 404 Permit for wetland impacts; it is anticipated any jurisdictional wetland or waterbody impacts would fall under the threshold of a Nationwide Permit	2nd Quarter 2021
U.S. Environmental Protection Agency (Region 8) in coordination with the South Dakota Department of Health	SPCC Plan	2nd Quarter 2021
Federal Aviation Administration (FAA)	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	Completed, although not required by the FAA for the Project
	Notice of Actual Construction or Alteration (Form 7460-2)	As required by the FAA
State of South Dakota Approvals		
SDPUC	Facility Permit	1st Quarter 2021
SDDENR	Section 401 Water Quality Certification (completed if qualify for a Section 404 Nationwide Permit)	Individual certification not anticipated to be required

Table 11.1-1 Potential Permits and Approvals		
Regulatory Authority	**Permit/Approval**	**Status/Anticipated Completion**
	National Pollutant Discharge Elimination System General Stormwater Permit for Construction Activity	2nd Quarter 2021
	Temporary Water Use Permit for Construction Activities	Ongoing during construction
	Water Rights Permit for Nonirrigation Use	2nd Quarter 2021
	Temporary Discharge Permit	2nd Quarter 2021
SDDOT Aeronautics Commission	Submission of FAA DNHs	2nd Quarter 2021
Local Approvals		
Pennington County	Conditional Use Permit	3rd Quarter 2020
	Right-of-way permits, crossing permits, driveway permits for access roads, building permit for O&M building, sign permit, conditional use permit and building permit for USES and transmission line, floodplain development permit.	2nd Quarter 2021

11.2 Agency Involvement in Pre-Application

As part of pre-Application efforts, Wild Springs Solar initiated its outreach campaign to public agencies through in-person meetings and Project notification letters. Many agencies, stakeholders, landowners, and interested parties were contacted to gather feedback on the Project (refer to Table 11.2-1). This included meetings with the USFWS, SDGFP, and county officials.

On June 1, 2017, Wild Springs sent an informal Project introduction letter and map to federal and state agencies. As the Land Control Area evolved, Wild Springs sent follow-up letters on October 4, 2019 and January 30, 2020. Additionally, Wild Springs had resource-specific meetings and correspondence with several agencies. Wild Springs requested input with respect to the resources under their jurisdiction as well as the identification of permits and/or approvals that may potentially be required for the Project.

A representative letter and responses received as of April 2020 are included in Appendix A – Agency Correspondence. A summary of responses and meetings with federal and state agencies is included below, and Wild Springs will continue to coordinate with federal and state agencies as Project development progresses. Wild Springs will also continue to coordinate with county officials as the Project moves forward and will seek any necessary local permits. Table 11.2-1

identifies agencies or entities that were contacted through meetings or a notification letter and the date that meetings or responses took place.

Table 11.2-1
Wild Springs Solar Agency Correspondence

Agency	Response Date (Type)
Federal	
U.S. Army Corps of Engineer, Omaha District	August 24, 2017 (Agency response) December 13, 2019 (Agency response) February 7, 2020 (Agency response) March 18, 2020 (Agency response)
U.S. Fish and Wildlife Service, South Dakota Ecological Services Field Office	July 3, 2017 (Agency response) January 22, 2020 (Meeting) March 9, 2020 (Agency response)
Federal Aviation Administration	March 17, 2020 (Agency response)
U.S. Department of Agriculture, Natural Resource Conservation Service	February 5, 2020 (Agency response)
U.S. Forest Service	No response to date
Ellsworth Air Force Base	February 21, 2020 (Agency response)
State	
South Dakota Department of Environment and Natural Resources	October 21, 2019 (Agency response) February 5, 2020 (Agency response)
South Dakota Department of Transportation – Office of Air, Rail & Transit, Aeronautics Commission	February 5, 2020 (Agency response)
South Dakota Game, Fish and Parks	April 17, 2017 (Agency response) July 7, 2017 (Agency response) October 22, 2019 (Agency response) January 22, 2020 (Meeting) February 25, 2020 (Agency response) April 3, 2020 (Agency response)
South Dakota Game, Fish and Parks – Natural Heritage Program	October 29, 2019 (Agency response) February 13, 2020 (Agency response)
South Dakota State Historic Preservation Office	April 21, 2020 (Agency response)
Local	
Pennington County	July 2017 (Meeting with Planning and Zoning) May 17, 2019 (Meeting with Planning and Zoning) February 4, 2020 (Meeting with Planning and Zoning) February 11, 2020 (Meeting with Highway Department)
Other	

Table 11.2-1 Wild Springs Solar Agency Correspondence	
Agency	**Response Date (Type)**
Geronimo-Basin Electric Power Cooperative Power Purchase Agreement Press Release	February 18, 2020 (Press Release Article)
Rushmore Electric Power Cooperative	October 8, 2019 (Letter of Support)

11.2.1 Federal Agencies

11.2.1.1 U.S. Army Corps of Engineers

On August 24, 2017, the USACE issued a JD concurring with the wetland delineation for the initial 1,000-acre Land Control Area. On December 13, 2019 and February 7, 2020, the USACE responded to the Project introduction letters and provided information regarding the potential permitting process for the Project including requirements under Section 404 of the Clean Waters Act, as well as additional consultations that may be required for the Project.

Wild Springs submitted the wetland delineation for the additional 643 acres in the Land Control Area for a JD in January 2020. On March 18, 2020, USACE provided a JD for all wetlands within the 1,643 acres surveyed, including the 1,499-acre Land Control Area. Additionally, Wild Springs has incorporated delineated wetlands and waterbodies into the design of the Project; the Project will minimize impacts to waters of the U.S. (see Section 9.2 for more information).

11.2.1.2 U. S. Fish & Wildlife Service

On July 3, 2017, the USFWS responded to the Project notification letter and provided comments on threatened and endangered species (whooping crane and NLEB), wetlands, migratory birds, birds of conservation concern, eagles, and power lines.

Additionally, on January 22, 2020, Wild Springs held a joint meeting with USFWS and SDGFP to provide an update on the Project and discuss wildlife survey efforts. Wild Springs has conducted another year of prairie grouse lek surveys and ground-based raptor nest surveys; no prairie grouse leks or raptor nests were identified in the Land Control Area. Wild Springs has provided both the 2020 Prairie Grouse Lek Survey Report and Raptor Nest Report to USFWS and SDGFP. Wild Springs proposes to conduct breeding bird surveys during summer 2020 to provide a baseline for comparison after construction.

On March 9, 2020, the USFWS provided environmental scoping comments to WAPA on the Project. The agency's comments in this letter focused on the potential for fragmentation to grassland birds. Since direct and indirect impacts to grassland birds from solar development is not well understood, Wild Springs has committed to conducting a baseline breeding bird survey in Summer 2020, followed by post-construction breeding bird surveys in years two and four of Project operation. Comparison of the pre- and post-construction survey results will help agencies and developers better evaluate the impacts of a solar facility in grassland and herbaceous habitat (see Section 9.3.3 for more information).

11.2.1.3 Federal Aviation Administration

As noted in Section 9.7.3 (Transportation), Wild Springs filed FAA 7460-1 Notice of Proposed Construction forms for the perimeter of the Land Control Area. On March 17, 2020, the Federal Aviation Administration provided Determinations of No Hazard to air navigation for each of the four points around the Land Control Area. As such, Project facilities will not exceed obstruction standards and would not be a hazard to air navigation.

11.2.1.4 U. S. Department of Agriculture, Natural Resource Conservation Service

Wild Springs consulted the Belle Fourche office of the USDA-NRCS on recommended seed mixes based on the South Dakota NRCS standards. On February 5, 2020, the agency provided information on seed mixes based on soil conditions, seeding method, and seeding timelines. Wild Springs has incorporated these recommendations into the Vegetation Management Plan (Appendix C).

11.2.1.5 Ellsworth Air Force Base

Wild Springs consulted with Ellsworth Air Force Base on the Project and military missions. On February 21, 2020, Ellsworth confirmed the Project will not impact present or future missions.

11.2.2 State Agencies

11.2.2.1 South Dakota Department of Environment and Natural Resources

On October 21, 2019 and February 5, 2020, SDDENR confirmed the Project will have little or no impact on surface water quality (see Section 9.2 for more information).

11.2.2.2 South Dakota Department of Transportation – Air, Rail & Transit, Aeronautics Commission

On February 5, 2020, the SDDOT provided comments on the Project. The agency noted the Project would not pose an obstruction hazard to any South Dakota airports and recommended Wild Springs submit FAA Form 7460-1 to confirm the Project will not impact navigation signal reception. As noted above in 11.2.1.2, Wild Springs filed FAA Form 7460-1 and received Determinations of No Hazard from the FAA on March 17, 2020. Lastly, SDDOT noted the FAA Determinations of No Hazard must be provided to the Aeronautics Commission prior to the start of construction; Wild Springs will submit the FAA Determinations of No Hazard to the Aeronautics Commission prior to construction.

11.2.2.3 South Dakota Game, Fish & Parks

Wild Springs has been coordinating with SDGFP since early 2017 on survey protocols, habitat, and species of concern. In April 2017, SDGFP provided guidance on the prairie grouse lek survey protocol. In July 2017, SDGFP responded to the initial Project notification letter and provided comments on pre- and post-construction studies, grassland birds, prairie grouse, power line safety

for birds, bat species that may occur, and the lack of known threatened, endangered, or rare species in the Land Control Area.

In October 2019, SDGFP responded to the updated Project notification letter and reiterated the July 2017 comments, particularly related to grassland birds and their habitat. In January 2020, Wild Springs held a joint meeting with SDGFP and USFWS to discuss the Project and wildlife survey efforts. As discussed above in Section 11.2.1.2, Wild Springs conducted an additional year of prairie grouse lek surveys and ground-based raptor nest surveys, and will a conduct grassland breeding bird survey starting late May through June 2020 to serve as a baseline to compare post-construction breeding bird surveys. This plan is discussed more in Section 9.3.2.1 and in the Natural Resource Strategy (Appendix G).

SDGFP provided environmental scoping comments to WAPA on April 3, 2020. The state wildlife agency addressed concerns related to grassland birds, pre-and-post-construction studies, sensitive species, and big game. SDGFP acknowledged that "little research exists on the impacts of solar energy facilities sited in grassland and herbaceous habitat, and that post-construction wildlife use studies would be valuable to assist with future project reviews and planning." Wild Springs is committed to a scientific approach to understanding impacts of solar energy on grassland birds and anticipates this Project will be one of the first in the country to do so (see Section 9.3.3 for more information).

11.2.2.4 South Dakota Game, Fish & Parks – Natural Heritage Program

The SDGFP Natural Heritage Program reviewed the initial 1,000-acre Land Control Area and the expanded 1,499-acre Land Control Area. The state agency responded on October 29, 2019 and February 13, 2020 that the South Dakota Natural Heritage Database, which monitors species at risk contains no documented threatened, endangered, or rare species in the Land Control Area (see Section 9.3.3 and 9.3.4).

11.2.2.5 South Dakota State Historic Preservation Office

On April 21, 2020, the South Dakota Historical Society completed its Section 106 Project Consultation review with WAPA, concurring with determination that "No Historic Properties Affected" for the Project as the Project design avoids impacts to one previously unrecorded archaeological site (see Section 9.7.5 for more information).

11.2.3 Pennington County

Wild Springs Solar began coordination with Pennington County in 2017 on the Project. Most recently, Wild Springs attended a Conditional Use Permit pre-application meeting with the Planning and Zoning Department on February 4, 2020. A summary of these meetings is provided in in Table 11.2-1.

11.2.4 Other Stakeholders

11.2.4.1 Geronimo Energy - Basin Electric Power Cooperative Power Purchase Agreement Press Release

On February 18, 2020, Geronimo Energy and Basin Electric Power Cooperative issued a joint press release announcing the PPA for the 128 MW Wild Springs Solar Project. For the first time in Basin Electric's history, the utility is purchasing utility-scale solar to serve its members (see Section 2.0 for more information).

11.2.4.2 Rushmore Electric Power Cooperative

On October 8, 2019, Rushmore Electric Cooperative issued a letter of support for the Project, commenting on the Project being the only local power generation source and the Project's power staying in western South Dakota. Rushmore Electric also commented on Project benefits such as jobs, taxes, and economic development (see Section 2.0 for more information).

11.3 Local Community Input

On February 4, 2020, Wild Springs hosted an informational meeting for Project participants, landowners adjacent to the Project boundary, and local government officials in New Underwood. The purpose of the meeting was to provide an update on the Project's development and address any questions or concerns from landowners. Wild Springs is in the process of coordinating with adjacent landowners on vegetative screening to address aesthetic concerns as described in Section 9.5.4.2.

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

As described in Section 1.4, the Applicant has addressed the matters set forth in SDCL Chapter 49-41B and in ARSD Chapter 20:10:22 (Energy Facility Siting Rules). Pursuant to SDCL 49-41B-22, the information presented establishes that:

- the proposed solar energy facility complies with applicable laws and rules;
- the facility will not pose a threat of serious injury to the environment or to the social and economic condition of inhabitants in, or near, the Land Control Area;
- the facility will not substantially impair the health, safety, or welfare of the inhabitants; and
- the facility 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.

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

Accompanying this Application are pre-filed testimony and accompanying exhibits from the following individuals:

- Jay Hesse;
- Michael Morris;
- Chip LaCasse;
- Brie Anderson;
- Todd Mattson; and
- Melissa Schmit.

Wild Springs reserves the right to provide supplemental and/or rebuttal testimony, as needed, to further support this Application.

12.1 Applicant Verification

Melissa Schmit, being duly sworn, deposes and states that she is the Authorized Representative of the Applicant and is authorized to sign this Application on behalf of the Project Owner/Applicant, Wild Springs Solar, LLC.

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

Dated this 15th day of May 2020,

Melissa Schmit

13.0 REFERENCES

Audubon, undated. Central Flyway. Available at https://www.audubon.org/central-flyway. Accessed February 2020.

Bakker, K.K. South Dakota Species of Habitat Fragmentation Concern: Grassland Birds. Report developed for: U.S. Fish and Wildlife Service, South Dakota Ecological Field Services Field Office, Pierre, SD, 38 pp. Available online at: https://www.fws.gov/mountain-prairie/es/southDakota/SD_HAB_FRAG.pdf. Accessed April 2020.

Bat Conservation International, Inc. (BCI). 2016. Bat Species: Us Bats. Species ranges' from 2003-2016 data. Accessed November 2019. Available online at: http://www.batcon.org/resources/media-education/species-profiles

Briberg, J.S. 2016. Utility & Community Solar Should Use Native Landscaping. Clea Technica blog. Available online at: https://cleantechnica.com/2016/03/15/utility-and-community-solar-should-use-native-landscaping/. Accessed February 2020.

Bryce, S., J. M. Omernik, D. E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S. H. Azevedo. 1998. Ecoregions of North Dakota and South Dakota. Northern Prairie Wildlife Research Center (NPWRC) Online. Jamestown, North Dakota.

Caceres, M.C and R.M.R. Barclay. 2000. *Myotis septentrionalis*. Mammalian Species 634:1-4

Connelly, J. W., M. W. Gratson, and K. P. Reese. 1998. Sharp-Tailed Grouse (*Tympanuchus phasianellus*). A. Poole and F. Gill, eds. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. Retrieved from The Birds of North America Online. Available online at: https://birdsoftheworld.org/bow/historic/bna/shtgro/2.0/introduction. Accessed March 2020.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. Office of Biological Services, Washington, D.C. FWS/OBS-79/31. December 1979. Available online at: https://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf. Accessed March 2020.

DeVault, T.L., Seamans, T.W., Schmidt, J.A., Belant, J.L., Blackwell, B.F., Mooers, N., Tyson, L.A. and Van Pelt, L., 2014. Bird Use of Solar Photovoltaic Installations at US Airports: Implications for aviation safety. Landscape and Urban Planning, 122, pp.122-128.

Department of Energy (DOE), Office of Energy Efficiency & Renewable Energy. SunShot 2030. Available online at: https://www.energy.gov/eere/solar/sunshot-2030. Accessed May 2020.

eBird. 2018. Ebird: An Online Database of Bird Distribution and Abundance. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available online at: https://ebird.org/home. Accessed September 2018

Ellsworth Air Force Base. 2017. Economic Impact Statement, Fiscal Year 2016. Available online at: https://dot.sd.gov/media/documents/2020-2022SDAirportDirectoryHQ.pdf. Accessed March 2020.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. U.S. Army Corps of Engineers. Wetlands Research Program Technical Report Y-87-1.

Federal Communications Commission. 2020. Fixed Broadband Deployment map, New Underwood, South Dakota. Available online at: https://broadbandmap.fcc.gov/#/location-summary?version=jun2019&place_name=New%20Underwood,%20South%20Dakota,%20United%20States&lat=44.0933&lon=-102.8363&tech=acfosw&speed=25_3&vlat=44.093732002005254&vlon=-102.83559100000002&vzoom=17.485711681812834. Accessed March 2020.

Federal Emergency Management Agency (FEMA). 2013. FEMA Flood Map Service Center. Available online at: https://msc.fema.gov/portal/search#searchresultsanchor. Accessed February 2020.

Fenneman, N.M. 1916. Physiographic Subdivision of the United States. Department of Geology, University of Cincinnati. Available online at: http://www.pnas.org/content/3/1/17.full.pdf. Accessed February 2020.

Griffiths, J. L., J. D. Dart, and D. E. Meade. 2019. Avian Utilization and Species Richness at a Large-Scale Photovoltaic Solar Facility in San Luis Obispo County, California. Poster Session. Annual Wildlife Society – Western Section Conference.

Harris, C.M. 1991. *Handbook of Acoustical Measurements and Noise Control*, 3rd Edition. 1991. McGraw-Hill. 1024 pp.

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

Johnson, J. A., M. A. Schroeder, and L. A. Robb. 2011. Greater Prairie-Chicken (*Tympanuchus Cupido*), Version 2.0. A. F. Poole, ed. In: The Birds of North America. Cornell Lab of Ornithology, Ithaca, New York. Retrieved from The Birds of North America Online. Available online at: https://birdsna.org/Species-Account/bna/species/grpchi/introduction. Accessed March 2020.

Kagan, Rebecca A., Tabitha C. Viner, Pepper W. Trail, and Edgard O. Espinoza. 2014. Avian Mortality at Solar Energy Facilities in Southern California: a Preliminary Analysis. National Fish and Wildlife Forensics Laboratory, April 2014.

Lazard. 2019. Levelized Cost of Energy Comparison, Unsubsidized Analysis. Version 13.0. Available online at: https://www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-130-vf.pdf. Accessed April 2020.

Lovich, J. E. and J. R. Ennen. 2011. Wildlife Conservation and Solar Energy Development in the Desert Southwest, United States. Bioscience 61(12): 982-992.

Martin, J.E., J.F. Sawyer, M.D. Fahrenbach, D.W. Tomhave, and L.D. Schultz. 2004. Geologic map of South Dakota. South Dakota Geological Society, Map 10. Scale 1:500,000. Available online at: http://www.sdgs.usd.edu/pubs/pdf/G-10.pdf. Accessed February 2020.

McGarr, P.L. & Lines, A.R. 2018. CohnReznick on behalf of SunVest Solar, Inc., Adjacent Property Values Solar Impact Study: A study of Nine Existing Solar Farms. Available online at: https://www.oglecounty.org/document_center/planning%20&%20zoning/Solar%20Ad%20Hoc%20Committee/PV%20Impact%20Studies/CR%20-%20SunVest%20Solar%20-%20Solar%20Farm%20Impact%20Study%20(Report%20Date%205-30-2018).pdf. Accessed March 2020.

Montag, Hannah, Guy Parker, and Tom Clarkson. 2016. The Effects of Solar Farms on Local Biodiversity; A Comparative Study. Clarkson and Woods and Wychwood Biodiversity. Available online at: https://www.solar-trade.org.uk/wp-content/uploads/2016/04/The-effects-of-solar-farms-on-local-biodiversity-study.pdf. Accessed December 2019.

Moore-O'Leary, K. A., R. R. Hernandez, D. S. Johnston, S. R. Abella, K. E. Tanner, A. C. Swanson, J. Kreitler, and J. E. Lovich. 2017. Sustainability of utility-scale solar energy–critical ecological concepts. Frontiers in Ecology and the Environment, 15(7), pp.385-394. Available online at https://www.researchgate.net/profile/Rebecca_Hernandez2/publication/319116547_Sustainability_of_utility-scale_solar_energy_-_critical_ecological_concepts/links/5995f95f458515017ea5f8cc/Sustainability-of-utility-scale-solar-energy-critical-ecological-concepts.pdf. Accessed March 2020.

Multi-Resolution Land Characteristics Consortium (MRLC). 2016. National Land Cover Database. Available online at: https://www.mrlc.gov/national-land-cover-database-nlcd-2016. Accessed February 2020.

National Park Service (NPS). 2011. Nationwide Rivers Inventory. Available online at: https://www.nps.gov/ncrc/programs/rtca/nri/index.html. Accessed February 2020.

NPS. 2017. National Park Service, Physiographic Provinces. Available online at: https://www.nps.gov/subjects/geology/physiographic-provinces.htm. Accessed February 2020.

National Renewable Energy Lab (NREL). 2017. Direct Normal Solar Resource of South Dakota. Available online at: https://www.nrel.gov/gis/solar.html. Accessed February 2020.

Northern State University. Undated. South Dakota Aquifers. Available online at: http://www.sdgs.usd.edu/pdf/SD_Aquifers_NatSrc.pdf. Accessed March 2020.

Occupational Safety and Health Administration. United States Department of Labor. 2016. OSHA Technical Manual, Section III: Chapter 5 Noise. Available online at: https://www.osha.gov/dts/osta/otm/new_noise/. Accessed February 2020.

Pardieck, K. L., D. J. Ziolkowski, Jr., M. Lutmerding, V. Aponte, and M.-A. R. Hudson. 2019. North American Breeding Bird Survey Dataset 1966 - 2018, Version 2018.0. US Geological Survey (USGS), Patuxent Wildlife Research Center. Available online at: https://www.pwrc.usgs.gov/BBS/RawData/. Accessed March 2020.

Pennington County. Undated. Declared Weeds and Pests. Available online at https://www.pennco.org/?SEC=6814BD7A-B40F-49C8-BC0C-EF351BBF52CF. Accessed February 2020.

Pennington County. 2019. Pennington County Planning Department, Pennington County Zoning Ordinance. Available online at http://docs.pennco.org/docs/PZ/ZoneOrdinance.pdf. Accessed February 2020.

Pipeline and Hazardous Materials Safety Association. 2020. National Pipeline Mapping System, Public Map Viewer. Available online at: https://pvnpms.phmsa.dot.gov/PublicViewer/. Accessed March 2020.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante. 1993. Handbook of Field Methods for Monitoring Landbirds. General Technical Report (GTR). PSW-GTR-144. US Department of Agriculture (USDA) Forest Service General Technical Report (GTR), Pacific Southwest (PSW) Research Station, Albany, California. Available online at: https://www.fs.usda.gov/treesearch/pubs/3639. Accessed March 2020.

Rosenstock, S. S., D. A. Anderson, K. M. Giesen, T. Leukering, and M. F. Carter. 2002. Landbird Counting Techniques: Current Practices and an Alternative. The Auk 119(1): 46-53. doi: 10.1093/auk/119.1.46. Available online at: https://www.researchgate.net/publication/335654242_Landbird_Counting_Techniques_Current_Practices_and_an_Alternative. Accessed March 2020.

Rothrock, E.P. 1943. A Geology of South Dakota, Part I: The Surface. State of South Dakota State Geological Survey. Bulletin Number 13. Available online at: http://www.sdgs.usd.edu/pubs/pdf/B-13.pdf. Accessed February 2020.

Rukstales, K.S., and M.D. Petersen. 2019. Data Release for 2018 Update of the U.S. National Seismic Hazard Model: U.S. Geological Survey data release. Available online at https://doi.org/10.5066/P9WT5OVB. Accessed February 2020.

Schultz, L.G., H.A. Tourtelot, J.R. Gill, and J.G. Boerngen. 1980. Composition and Properties of the Pierre Shale and Equivalent Rocks, Northern Great Plains Region. Geological Survey Professional Paper 1064-B. United States Government Printing Office, Washington, D.C. Available online at: https://pubs.usgs.gov/pp/1064b/report.pdf. Accessed February 2020.

Selbig, W.R., and N. Balster, 2010. Evaluation of turf-grass and prairie-vegetated rain gardens in a clay and sand soil, Madison, Wisconsin, water years 2004–08: U.S. Geological Survey Scientific Investigations Report 2010–5077, 72 p. Available online at: https://pubs.usgs.gov/sir/2010/5077/. Accessed February 2020.

Sinha, P., Hoffman, B., Sakers, J. and Althouse, L., 2018. Best Practices in Responsible Land Use for Improving Biodiversity at a Utility-Scale Solar Facility. Case Studies in the Environment.

Smitt, J.A., J. Seay, D. Zajanc, S.B. Terrill, B.B. Boroski, and D.S. Johnston. 2013. Initial Responses of Raptors and Other Birds to Development of a Large Photovoltaic Solar Facility in California. 2013. Abstracts from I Worldwide Raptor Conference, October 2013, Bariloche, Argentina. Available online at: https://raptorresearchfoundation.org/files/2013/10/WorldwideRaptorConferenceProgram.pdf. Accessed March 2020.

Smith, J. A. and J. F. Dwyer. 2016. Avian Interactions with Renewable Energy Infrastructure: An Update. Condor 118(2): 411-423. doi: 10.1650/CONDOR-15-61.1.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture, 2020. Web Soil Survey. Available online at: https://websoilsurvey.sc.egov.usda.gov/. Accessed February 2020.

Solar Energy Industries Association. 2019. Solar and Property Value Fact Sheet, Correcting the Myth that Solar Harms Property Value. Available online at: https://www.seia.org/sites/default/files/2019-09/Solar%20Property%20Value%20FactSheet%202019-PRINT_1.pdf. Accessed March 2020.

South Dakota Department of Agriculture (SDDOA). 2012a. State Noxious Weed and Pest List. Available online at: https://sdda.sd.gov/ag-services/weed-and-pest-control/weed-pest-control/sd-state-noxious-weed-declared-pest-list-and-distribution-maps/default.aspx. Accessed February 2020.

SDDOA. 2012b. County Noxious Weed and Pest List. Available online at: https://sdda.sd.gov/ag-services/weed-and-pest-control/weed-pest-control/county-noxious-weed-pest-list-and-distribution-maps/default.aspx. Accessed February 2020.

South Dakota Department of Environment and Natural Resources (SDDENR). Undated. Oil and Gas Resources. SDDENR – Geological Survey Program. Interactive map available online at: http://usd.maps.arcgis.com/apps/webappviewer/index.html?id=9888ec2e3ee844998385265dfa22e449&center=-100.33,%2044.36. Accessed February 2020.

SDDENR. 2016. Map of Air Quality Monitoring Sites. Available online at: http://denr.sd.gov/des/aq/monitoring/state-mo.aspx. Accessed February 2020.

SDDENR. 2018. The 2018 South Dakota Integrated Report for Surface Water Quality Assessment. Available online at: https://denr.sd.gov/documents/18irfinal.pdf. Accessed February 2020.

SDDENR. 2020a. South Dakota Water Rights. Online database available at: http://denr.sd.gov/des/wr/dbwrsearch.aspx. Accessed March 2020.

SDDENR. 2020b. South Dakota Dry Draw Location Notice Search. Online database and interactive map available online at: http://arcgis.sd.gov/server/denr/locationnotice/default.aspx. Accessed March 2020.

SDDENR. 2020c. South Dakota Water Well Completion Reports. Online database and interactive map available online at: http://arcgis.sd.gov/server/denr/wellLogs/default.aspx. Accessed March 2020.

SDDENR. 2020d. Using Water in South Dakota. Available online at: http://denr.sd.gov/des/wr/wateruse.aspx. Accessed March 2020.

SDDENR. 2020e. Pending Applications to Appropriate Water and Future Use Reviews. Available online at: http://denr.sd.gov/des/wr/pubnotice.aspx. Accessed March 2020.

South Dakota Department of Transportation (SDDOT). 2020. South Dakota 2020-2022 Airport Directory. Available online at: https://dot.sd.gov/media/documents/2020-2022SDAirportDirectoryHQ.pdf. Accessed February 2020.

South Dakota Game, Fish, and Parks (SDGFP). Undated. South Dakota Wildlife Action Explorer (Mammal Species Checklist and Reptile & Amphibian Species Checklist). Available at https://apps.sd.gov/gf43wap/. Accessed February 2020.

SDGFP. Undated. South Dakota Public Fishing Access – Online Mapping Tool. Available at: https://sdgfp.maps.arcgis.com/apps/webappviewer/index.html?id=79c3f941ae6c4abbbc6ac4b6987a06f5. Accessed February 2020.

SDGFP. 2004. South Dakota Bat Management Plan. South Dakota Bat Working Group, Wildlife Division Report 2004-08. July 13, 2004 Available at: https://gfp.sd.gov/UserDocs/nav/bat-managment-plan.pdf. Accessed February 2020.

SDGFP. 2014. South Dakota Wildlife Action Plan. SDGFP, Pierre, South Dakota. Available online at: https://gfp.sd.gov/UserDocs/nav/SD_Wildlife_Action_Plan_Revision_Final.pdf. Accessed March 2020.

SDGFP. 2020a. Big Game: Antelope. Available at https://gfp.sd.gov/antelope/. Accessed February 2020.

SDGFP. 2020b. Big Game: Deer. Available at https://gfp.sd.gov/deer/. Accessed February 2020.

South Dakota Geologic Survey (SDGS). 2013. Earthquakes in South Dakota (1872-2013) Map. Available online at http://www.sdgs.usd.edu/publications/maps/earthquakes/earthquakes.htm. Accessed February 2020.

Taylor, R., J. Conway, O. Gabb, and J. Gillespie. 2019. Potential ecological impacts of ground-mounted photovoltaic solar panels. An introduction and literature review. Available online: http://avesnature.com.pl/wp-content/uploads/Solar-Panels-and-Wildlife-Review-2019.pdf . Accessed March 2020.

Timpone, J.C., J.G. Boyles, K.L. Murray, D.P. Aubrey, and L.W. Robbins. 2010. Overlap in roosting habits of Indiana bats (*Myotis sodalis*) and northern bats (*Myotis septentrionalis*). The American Midland Naturalist 163:115-123.

U.S. Census Bureau. 2018a. 2018: American Community Survey 5-year Estimates, Selected Housing Characteristics, Rapid City, South Dakota. Available online at https://data.census.gov/cedsci/table?q=DP04%3A%20SELECTED%20HOUSING%20CHARACTERISTICS&g=1600000US4652980&hidePreview=true&tid=ACSDP5Y2018.DP04&vintage=2018. Accessed April 2020.

U.S. Census Bureau. 2018b. 2018: American Community Survey 5-year Estimates, Selected Housing Characteristics, Pennington County, South Dakota. Available online at https://data.census.gov/cedsci/table?g=0400000US46_0500000US46103&tid=ACSDP5Y2018.DP04&vintage=2018&t=Housing&hidePreview=false&layer=VT_2018_040_00_PY_D1&cid=DP04_0001E. Accessed April 2020.

U.S. Census Bureau. 2018c. 2018: American Community Survey 5-year Estimates, Selected Economic Characteristics, New Underwood (city), Pennington County, South Dakota. Available online at https://data.census.gov/cedsci/table?q=DP03%3A%20SELECTED%20ECONOMIC%20CHARACTERISTICS&g=0400000US46_0500000US46103&hidePreview=true&tid=ACSDP5Y2018.DP03. Accessed April 2020.

U.S. Census Bureau. 2019. QuickFacts, Pennington County, South Dakota, United States. Available online at https://www.census.gov/quickfacts/fact/table/penningtoncountysouthdakota,SD,US/PST045219. Accessed April 2020.

United States Department of Agriculture (USDA). 2017. 2017 Census of Agriculture: Pennington County, South Dakota. National Agricultural Services Statistics. Available online at: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/South_Dakota/st46_2_0001_0001.pdf. Accessed January 2020.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. Accessed March 2020.

U.S. Energy Information Administration (EIA). 2020. Stouth Dakota: State Profile and Energy Estimates. Available online at: https://www.eia.gov/state/?sid=SD. Accessed April 2020.

U.S. Environmental Protection Agency (EPA). 2013. Level III and IV Ecoregions of the Continental United States: Corvallis, Oregon, U.S. EPA, National Health and

Environmental Effects Research Laboratory, map scale 1:3,000,000. Available online at: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states. Accessed March 2020.

United States Fish and Wildlife Service (USFWS). 2007. National Bald Eagle Management Guidelines. Arlington, VA. May 2007. Available online at: http://www.fws.gov/midwest/eagle/pdf/NationalBaldEagleManagementGuidelines.pdf. Accessed February 2020.

USFWS. 2008. Birds of Conservation Concern 2008. U.S. Fish and Wildlife Service Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Available online at: https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf. Accessed February 2020.

USFWS. 2012. Whooping Crane (*Grus americana*) 5-Year Review: Summary and Evaluation. Available at https://www.fws.gov/southwest/es/Documents/R2ES/Whooping_Crane_5-yr_Review_Feb2012.pdf. Accessed February 2020.

USFWS. 2012. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. Available online at: https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf.

USFWS. 2014. Endangered and Threatened Wildlife and Plants; Threatened Species Status for Rufa Red Knot; Final Rule. 50 Federal Register 79(238): 73706 (December 11, 2014).

USFWS. 2015. Migratory Bird Treaty Act. Available online at: https://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php.

USFWS. 2016a. Endangered and threatened wildlife and plants; 4(d) rule for the northern long-eared bat. Federal Register 81:1900-1922. Available at: https://www.fws.gov/midwest/endangered/mammals/nleb/index.html. Accessed February 2020.

USFWS. 2016b. Programmatic biological opinion on final 4(d) rule for the northern long-eared bat and activities excepted from take prohibitions. Bloomington, MN: FWS Midwest Regional Office.

USFWS. 2018. Migratory Bird Treaty Act. Available online at https://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php. Accessed February 2020.

USFWS. 2019a. Information for Planning and Consultation (IPaC). USFWS Environmental Conservation Online System (ECOS). Available online at: https://ecos.fws.gov/ipac/. Accessed November 2019.

USFWS. 2019b. Least Tern (Interior Population) (*Sterna antillarum*): Fact Sheet Available at https://www.fws.gov/midwest/endangered/birds/leasttern/IntLeastTernFactSheet.html. Accessed February 2020.

USFWS. 2019c. Northern Long-Eared Bat Final 4(d) Rule: White-Nose Syndrome Zone Around WNS/Pd Positive Counties/Districts. Available at https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf. Accessed February 2020.

U.S. Geologic Survey (USGS). 1996. Groundwater atlas of the United States: Montana, North Dakota, South Dakota, Wyoming. (HA 730-I). Available online at: https://pubs.usgs.gov/ha/ha730/ch_i/index.html. Accessed March 2020.

USGS. 2003. Ground-Water Resources in the Black Hills Area, South Dakota – Water-Resources Investigations Report 03-4049. Available online at: https://pubs.usgs.gov/wri/wri034049/. Accessed March 2020.

USGS. Undated. National Hydrography Dataset. Available online at: https://www.usgs.gov/core-science-systems/ngp/national-hydrography/national-hydrography-dataset?qt-science_support_page_related_con=0#qt-science_support_page_related_con. Accessed February 2020.

USGS. 2016. Interactive Fault Map. Available online at: https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf. Accessed February 2020.

USGS. 2020. Watershed Boundary Dataset. National Hydrography Products. Available online at: https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer. Accessed February 2020.

Visitrapidcity.com. Undated. Rapid City Hotels and Lodging. Available online at https://www.visitrapidcity.com/where-to-stay. Accessed January 2020.

Visser, E., Perold, V., Ralston-Paton, S., Cardenal, A.C. and Ryan, P.G., 2019. Assessing the Impacts of a Utility-Scale Photovoltaic Solar Energy Facility On Birds in the Northern Cape, South Africa. Renewable energy, 133, pp.1285-1294.

Western Area Power Administration (WAPA) and USFWS. 2015. Programmatic Biological Assessment for the Upper Great Plains Region Wind Energy Program. Available online at: https://www.wapa.gov/regions/UGP/Environment/Pages/ProgrammaticWindEIS.aspx. Accessed February 2020.

Wildlife Service and United States Fish & Wildlife Service. 2007. International recovery plan for the Whooping Crane. p.162. Ottawa, Ontario and Albuquerque, New Mexico. 162 p.