September 2019

Minnesota Public Utilities Commission

Application for a Site Permit

PUC Docket No. IP7009/GS-19-495

Elk Creek Solar Project

Rock County, Minnesota

Submitted by:
Elk Creek Solar, LLC
7650 Edinborough Way
Suite 725
Edina, MN 55435

GERONIMO® ENERGY
a nationalgrid company

ELK CREEK SOLAR

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ACRONYM LIST

AADT	Annual Average Daily Traffic
AC	alternating current
AIMP	Agricultural Impact Mitigation Plan
Applicant	Elk Creek Solar, LLC
Application	Site Permit Application
AQI	Air Quality Index
Area M	Area M Consulting
ARMER	Allied Radio Matrix for Emergency Response
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
CAA	Clean Air Act
CO	carbon monoxide
Commission	Minnesota Public Utilities Commission
CON	Certificate of Need
CSAH	County State Aid Highway
CWI	County Well Index
dB	decibels
dBA	A-weighted decibels
DC	direct current
ECS	Ecological Classification System
Elk Creek/Elk Creek Solar	Elk Creek Solar, LLC
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GAP	Gap Analysis Program
Geronimo	Geronimo Energy, LLC
GPS	Global Positioning System
GIS	Geographic Information System
IPaC	Information for Planning and Conservation
kV	kilovolt

Land Control Area	Approximately 976-acre area of privately-owned land for which Elk Creek Solar, LLC has leases and purchase options to allow siting and construction of the Project
L_{10}	ten percent of any hour
L_{50}	fifty percent of any hour
LGU(s)	local government unit(s)
MBTA	Migratory Bird Treaty Act
MBS	Minnesota Biological Survey
MDH	Minnesota Department of Health
mG	milliGauss
MISO	Midcontinent Independent System Operator
MNDNR	Minnesota Department of Natural Resources
MDA	Minnesota Department of Agriculture
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NHIS	Natural Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NLEB	northern long-eared bat
NMFP	Nitrogen Fertilizer Management Plan
NO_2	nitrogen dioxide
NPCs	native plant communities
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O&M building	operations and maintenance building
O_3	ozone
Pb	lead
PEM	palustrine emergent wetland
PM	particulate matter
PPA	Power Purchase Agreement
Preliminary Development Area	Approximate 681-acre area where Elk Creek Solar, LLC proposes to build the Elk Creek Solar Project facilities
Project	Elk Creek Solar Project
PV	photovoltaic

PWI	Public Waters Inventory
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SGCN	Species of Greatest Conservation Need
SO_2	sulfur dioxide
SOBS	Sites of Biodiversity Significance
SSA	sole source aquifer
SSURGO	Soil Survey Geographic Database
SWAP	State Wildlife Action Plan
SWPPP	Stormwater Pollution Prevention Plan
TEP	Rock County Technical Evaluation Panel
TWh	terawatt hour
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USG	unhealthy for sensitive groups
USGS	U.S. Geological Survey
VMP	Vegetation Management Plan
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area
WNS	white-nose syndrome

Application Content Requirements Completeness Checklist

Project Permit Application Requirements (Minn. Rules 7850.1900, Subp. 1)	Application Section
A. a statement of proposed ownership of the facility as of the day of filing and after commercial operation;	1.2
B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated;	1.2
C. at least two proposed sites for the proposed large electric power generating plant and identification of the applicant's preferred site and the reasons for preferring the site;	2.4
D. a description of the proposed large electric power generating plant and all associated facilities, including the size and type of the facility;	2.1, 2.2
E. the environmental information required under subpart 3;	See Environmental Information below
F. the names of the owners of the property for each proposed site;	1.2
G. the engineering and operational design for the large electric power generating plant at each of the proposed sites;	3.1; Appendix B
H. a cost analysis of the large electric power generating plant at each proposed site, including the costs of constructing and operating the facility that are dependent on design and site;	2.5
I. an engineering analysis of each of the proposed sites, including how each site could accommodate expansion of generating capacity in the future;	2.6 and 3.1
J. identification of transportation, pipeline, and electrical transmission systems that will be required to construct, maintain, and operate the facility;	4.2.9, 3.1.8, and 3.1.7
K. a listing and brief description of federal, state, and local permits that may be required for the project at each proposed site; and	1.4.2
L. a copy of the Certificate of Need for the project from the Public Utilities Commission or documentation that an application for a Certificate of Need has been submitted or is not required.	1.4.1

Environmental Information Requirements (Minn. Rules 7850.1900, Subp. 3)	Application Section
A. a description of the environmental setting for each site or route;	4.1
B. a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services;	4.2
C. a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;	4.3
D. a description of the effects of the facility on archaeological and historic resources;	4.4
E. a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna;	4.5
F. a description of the effects of the facility on rare and unique natural resources;	4.5.8
G. identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route; and	4.6
H. a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures.	4.1 – 4.5

1.0 INTRODUCTION

Elk Creek Solar, LLC (Elk Creek, Elk Creek Solar, or Applicant), a wholly owned subsidiary of Geronimo Energy, LLC (Geronimo), a National Grid Company, respectfully submits this Site Permit Application (Application) to the Minnesota Public Utilities Commission (Commission) for a Site Permit pursuant to the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E) and Minnesota Administrative Rules Chapter 7850.

Elk Creek proposes to construct the Elk Creek Solar Project (Project), a solar energy conversion facility with an 80-megawatt (MW) alternating current (AC) nameplate capacity, in Vienna Township, Rock County, Minnesota (Figure 1 – Project Location). Northern States Power Company, doing business as Xcel Energy has entered into a power purchase agreement (PPA) with Elk Creek and intends to use the power generated by the Project to satisfy the growing demand for Xcel Energy's customers under it's Renewable*Connect Program. By way of example, the Project will generate up to 80 MW, enough energy to provide electricity for approximately 19,000 homes annually and avoid the emission of approximately 119,000 metric tons of carbon annually.[1] Elk Creek plans to construct the Project on a schedule that facilitates an in-service date by the end of 2021.

The Project falls within the definition of a Large Electric Power Generating Plant in the Power Plant Siting Act and, thus, requires a Site Permit from the Commission prior to construction. Elk Creek submitted a request to the Minnesota Department of Commerce for a size determination on May 14, 2019 in accordance with Minnesota Statutes Section 216E.021 (2014). In accordance with Minnesota Rules Pursuant to 2014 Session Laws, Chapter 254, Elk Creek seeks approval of its Application under the alternative review process provided for under Minnesota Statute 216E.04 and Minnesota Rules 7850.2800-7850.3900 and a notification letter was filed with the Commission on August 1, 2019. The Site Permit is the only site approval needed for construction of the Project (Minnesota Statutes 216E.10, subd. 1.). Other permits and licenses required for the Project are listed in Section 1.4.2.

Elk Creek is a wholly owned subsidiary of Geronimo, a National Grid Company. Geronimo is a utility-scale renewable energy development company headquartered in Edina, 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 over 250 MW of solar development 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] Based on EPA Greenhouse Gas Equivalencies Calculator and 168,000,000 kWh (168,000 MWhs) annual production PVSYST model.

1.1 Purpose and Need

On January 7, 2019 Xcel Energy submitted a Petition with the Commission for approval to expand their Renewable*Connect Program.[2] The Commission adopted an Order approving the Renewable*Connect program expansion proposal, and their renewable energy sourcing proposal, with certain modifications, on August 12, 2019.[3] Xcel Energy initiated the process of seeking Commission approval of the PPA with Elk Creek by filing the PPA on September 10, 2019 in a separate docket for Commission approval.[4]

Elk Creek and Xcel Energy entered into a 20-year PPA for the purchase and sale of all power generated by the Project. The proposed Project would install up to 80 MW of solar generating capacity in Minnesota that would contribute to satisfying Xcel Energy's and its consumers' demands for renewable energy. Xcel Energy initiated the process of seeking Commission approval of the PPA with Elk Creek. As a non-wind variable generation resource utilizing linear axis solar tracking systems to follow the path of the sun throughout each day, the Project will have a nameplate capacity of up to 80 MW AC. By way of example, the Project will produce enough energy to provide electricity for approximately 19,000 homes annually and avoid the emission of approximately 119,000 metric tons of carbon annually.[5]

The proposed Project would install up to 80 MW of solar generating capacity in Minnesota that can contribute to satisfying Xcel Energy's and its ratepayer's demands for renewable energy, and potentially help it meet its sustainability goals.

1.2 Applicant Information

1.2.1 Permittee and Contact Information

The permittee for the Site Permit will be:

Elk Creek Solar, LLC
7650 Edinborough Way, Suite 725
Edina, MN 55435

[2] *In the Matter of the Petition of Northern States Power Company for Approval of a Renewable*Connect Program* – and – *In the Matter of the Petition of Northern States Power Company for Approval of a Renewable Energy Rider,* Docket No. E002/M-19-33 (January 7, 2019)

[3] *See* Order Approving Petition With Modifications, Docket No. E-002/M-19-33 (August 12, 2019).

[4] Xcel Energy, Petition (Initial Filing) *In the Matter of the Petition of Northern States Power Company for Approval of Solar Energy Purchase Agreement with Elk Creek Solar, LLC for 80 MW Solar Generation*, Docket No. E002/M-19-568 (September 11, 2019)

[5] Based on EPA Greenhouse Gas Equivalencies Calculator and 168,000,000 kWh annual production PVSYST model.

The contact persons regarding this Application are:

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1.2.2 Statement of Ownership

Elk Creek has a combination of lease agreements and purchase options with the landowners for the Project site. The Project will be constructed, owned, and operated by Elk Creek, a wholly owned subsidiary of Geronimo. The land is currently owned by Chambers Family Farms, LLC, Harold and Joann Marie Schneiderman, David Tofteland, and Jeffery Westgor.

1.3 Project Schedule

The anticipated schedule for the Site Permit, construction, testing, and commercial operation is outlined below:

- **Land acquisition**: Complete. Elk Creek has a combination of lease agreements and purchase options for the Project site. After issuance of the Site Permit and prior to construction of the Project, Elk Creek will purchase a portion of the Project site from the underlying landowners with purchase options and the leases will enter into the construction and operations terms. Land that is under lease and which will not be utilized by the Project will revert back to the underlying landowner for continued agricultural use.
- **Site Permit:** Elk Creek anticipates the Site Permit will be issued in the Summer of 2020.
- **Other Permits:** Elk Creek will acquire all other permits necessary for construction of the Project prior to conducting the work for which the permit is required. Refer to Table 1.4-1 Potential Permits/Approvals.
- **Equipment Acquisition:** Elk Creek 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:** Elk Creek anticipates that construction will begin as early as fall of 2020 and will be completed by the end of 2021. Section 3.4 of this Application provides additional information on the construction timeline and 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 2021, following the completion of construction and testing.

1.4 Required Project Permits

1.4.1 Certificate of Need

A Certificate of Need (CON) is required for all "large energy facilities," as defined in Minnesota Statutes Section 216B.2421, subd. 2(1), unless the facility falls within a statutory exemption from the CON requirements. Because the Project is a generating plant larger than 50 MW, it meets the definition of a large energy facility and would require a CON prior to issuance of a Site Permit and construction. The Project does not currently fall within a statutory exemption from the CON requirements.

1.4.2 Other Permits

Elk Creek will obtain all permits and licenses that are required for the Project, following issuance of the Site Permit. The permits or approvals that Elk Creek has identified as potentially being required for the construction and operation of the Project are shown in Table 1.4-1. Copies of agency correspondence are included in Appendix A.

Table 1.4-1 Potential Permits/Approvals

Agency	Permit	Applicability	Permit Status and Timing
Federal			
U.S. Army Corps of Engineers (USACE)	Section 404 Permit for wetland impacts.	Dredging or filling jurisdictional waters of the United States	To be obtained prior to construction, if necessary
U.S. Environmental Protection Agency	Spill Prevention, Control, and Countermeasures Plan	Required if any facility associated with the Project (operations and maintenance [O&M] building or substation) has oil storage of more than 1,320 gallons	To be obtained prior to construction, if necessary
State			
Minnesota Public Utilities Commission	Site Permit	Construction of energy conversion facility	To be obtained prior to construction
	Certificate of Need	Required for generating plants larger than 50 MW	Filed concurrent with the Site Permit
Minnesota Pollution Control Agency	Section 401 Certification	Required for filling in jurisdictional waters of the United States and if a Section 404 permit is required from the USACE	To be obtained prior to construction, if necessary

Table 1.4-1 Potential Permits/Approvals

Agency	Permit	Applicability	Permit Status and Timing
	National Pollutant Discharge Elimination System General Permit (includes Stormwater Pollution Prevention Plan)	For stormwater discharges from construction activities with disturbances greater than one acre	To be obtained prior to construction
Minnesota Department of Health	Well construction permit	Required for installation of a well	To be obtained prior to construction of low-volume well at O&M building
Minnesota Department of Natural Resources	Water Appropriation Permit	Required if trench dewatering is necessary	To be obtained prior to construction, if necessary
Minnesota Department of Labor and Industry	Request for Electrical Inspection	Required to comply with the state electrical code	To be obtained during construction.
State Historic Preservation Office	Review and Coordination	Provide concurrence on Phase I inventory	Completed (Appendix A)
County/Local			
Rock County	Subsurface Sewage Treatment System Permit	Required prior to installation of any septic system in Rock County	To be obtained prior to construction for the O&M building
	Floodplain Development Permit	Required for development within a floodplain	Not applicable. There are no Federal Emergency Management Agency mapped floodplains in the Land Control Area
	Conditional Use Permit	Required for construction within Rock County	To be obtained prior to construction for the O&M facility and laydown areas
	County Entrance Permit	Required for access from county roads	To be obtained prior to construction
	Utility Permit	Required to place facilities within public road right-of-way	To be obtained prior to construction, if necessary
	Local government unit for Minnesota Wetland Conservation Act	Required for wetland impacts	To be obtained prior to construction, if necessary

2.0 PROJECT DESCRIPTION

2.1 Overall Project Description

Elk Creek Solar is currently developing the Elk Creek Solar Project, an up to 80 MW solar PV facility located in eastern Rock County, Minnesota. The Project would interconnect into the Magnolia Substation, which is adjacent to the Project. Elk Creek selected this location based on a number of factors, but a key consideration in the selection process was the Project's proximity to existing electrical and transportation infrastructure, including the Magnolia Substation and existing transmission lines. Existing infrastructure in the immediate vicinity allows Elk Creek to minimize the need to construct ancillary facilities beyond the main Project footprint.

2.2 Size and Location

Elk Creek is proposing to build its solar facility in Sections 27, 34, and 35, Township 103 North, Range 44 West, Rock County, Minnesota (Figure 1 – Project Location). Elk Creek has obtained leases and purchase options for 976 acres of privately-owned land (Land Control Area). Based on preliminary design, Project facilities will cover approximately 681 acres of the Land Control Area (Preliminary Development Area). There are approximately 295 acres of the Land Control Area for which Elk Creek has site control, but are currently not contemplated for occupation by solar facilities (Figure 2 – Land Control and Preliminary Development Areas). A 295-acre portion of the Land Control Area that will not be utilized by the Project is currently under lease with the underlying landowner and will be excluded from the area leased by Elk Creek during operation of the Project. The underlying landowner can then continue to farm the area released from the lease for the life of the Project. The total nameplate capacity for the proposed Project facilities is up to 80 MW AC.

The Elk Creek Solar Project is located 1.5 miles north of Magnolia. Elk Creek 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 Section 2.3).

In this Application, Elk Creek is providing a preliminary Project layout for both a below-ground electrical collection system (Figures 3 – Below-Ground Preliminary Project Layout and 4a-4e – Detailed Below-Ground Preliminary Project Layout; and displayed in more detail in Appendix B – Site Plan) and an above-ground electrical collection system (Figures 5 – Above-Ground Preliminary Project Layout and 6a-6e – Detailed Above-Ground Preliminary Project Layout). A hybrid Project layout with a combined below-ground and above-ground electrical system would have an array layout consistent with the Below-Ground Preliminary Project Layout. All layouts under consideration are within the Preliminary Development Area and subject to final micrositing. The Project's facilities are currently anticipated to be located within the Preliminary Development Area and include solar panels and racking, inverters, security fencing, Project substation, an operations and maintenance building (O&M building), on-site below-ground or above-ground electrical collection and communication lines, and up to two weather stations (up to 20 feet tall). There are five laydown areas proposed for both the below-ground (any hybrid) and above-ground configurations; however, they vary slightly based on the configuration. Four laydowns are

common to both below- and above-ground configurations and both configurations utilize one unique laydown area, based on the array layout (see Figures 3 and 5 – Below-Ground Preliminary Project Layout and Above-Ground Preliminary Project Layout, respectively and Section 3.1.1). This preliminary Project layout within the Preliminary Development Area reflects Elk Creek's effort to maximize the energy production of the Project, follow applicable setbacks, while minimizing impacts to the land, environment, 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; with the exception of the electrical infrastructure needed to connect the Project substation to the Magnolia substation, will not extend beyond the outer boundaries of the Land Control Area. While Elk Creek expects that the final layout will remain considerably similar to and could include a combination of the preliminary layout presented in Figures 3 and 5 (Below-Ground Preliminary Project Layout and Above-Ground Preliminary Project Layout) and Appendix B (Site Plan), changes may occur as a result of ongoing site evaluation, permitting process, neighboring landowner preferences, and micro-siting activities. Project facilities are described in more detail in Section 3.0.

Elk Creek has entered into lease or purchase option agreements with landowners for all of the parcels on which the Project would be constructed. Elk Creek would exercise its purchase options and hold title to the property it will purchase after the Site Permit is issued and prior to the start of construction. Concurrently, leased property that will be utilized by the Project will move into an operation term of the lease agreement and property currently under lease that is not utilized by the Project will be removed from the lease agreement and the underlying landowner will continue to be allowed to farm the released property.

2.3 Prohibited and Exclusion Sites

Minnesota Rules 7850.4400 subp. 1 prohibits power generating plants from being sited in several prohibited areas, including: national parks; national historic sites and landmarks; national historic districts; national wildlife refuges; national monuments; national wild, scenic and recreational riverways; state wild, scenic, and recreational rivers and their land use districts; state parks; nature conservancy preserves; state scientific and natural areas; and state and national wilderness areas. The Project facilities are not located within any prohibited areas.

Additionally, Minnesota Rules 7850.4400 subp. 3 requires that applicants avoid siting power generating plants in several exclusion areas unless there is no feasible and prudent alternative. These exclusion areas include: state registered historic sites; state historic districts; state Wildlife Management Areas (WMAs); county parks; metropolitan parks; designated state and federal recreational trails; designated trout streams; and state water trails. The Project facilities are not located within any exclusion areas. An analysis of Elk Creek's avoidance of exclusion areas and other sensitive environmental areas is provided below in Section 2.3.2.

Subject to certain exceptions, Minnesota Rules 7850.4400, subp. 4 prohibits large energy power generating plants from being sited on more than 0.5-acre of prime farmland per MW of net generating capacity unless there is no feasible and prudent alternative. The Elk Creek Preliminary Development Area is sited on prime farmland (see Section 4.5.3). Given the 80 MW net generating capacity of the Project, this rule would allow use of up to 40 acres of prime farmland for the Project. Approximately 554 acres of prime farmland and 126 acres of prime farmland if drained

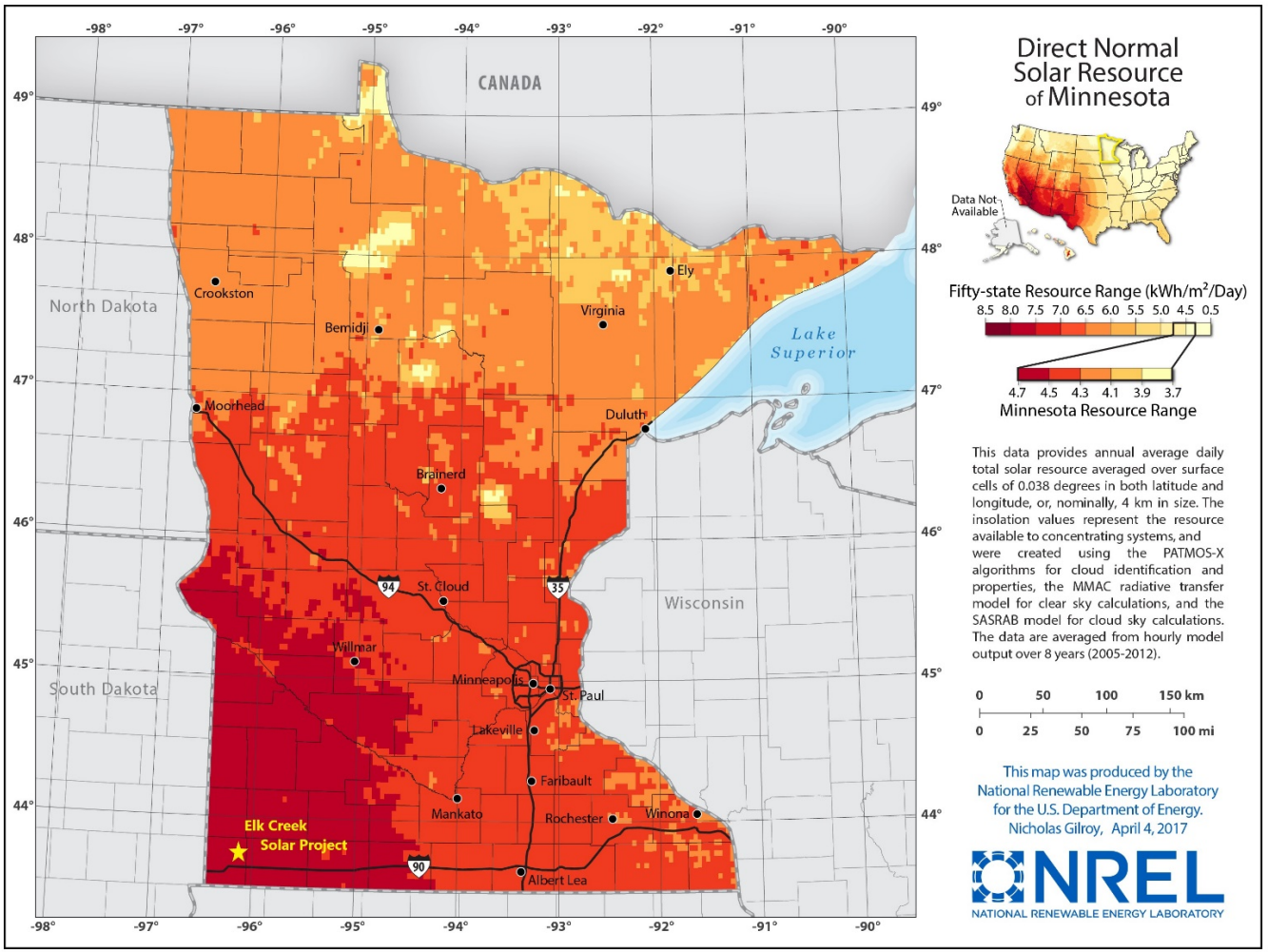
are located within the Preliminary Development Area. These acreages of prime farmland would be taken out of production for the life of the Project, but as described below would not be permanently removed. An analysis on potential alternatives to avoid prime farmland is provided in the following sections below.

2.3.1 Selection of the Land Control Area

Elk Creek explored Rock County for a solar project based on the high solar resource in this portion of the state (Image 1 – Direct Normal Solar Resource of Minnesota; NREL, 2017) and the positive experiences its parent company, Geronimo, had in developing the Prairie Rose Wind Farm (operational in December 2012). This exceptional solar resource and Geronimo's prior development history and supportive community were foundational to the Project's conception. Elk Creek identified the Magnolia substation as a potential interconnect location in Rock County because of its available capacity to interconnect the Project to the transmission system, a general lack of environmental constraints and the presence of adequate roads for access to a site and relatively flat unobstructed terrain in the vicinity of the substation to maximize the utilization of the solar resource. Elk Creek then met with landowners within approximately five miles of the Magnolia substation to gauge whether there was enough interest from relatively contiguous landowners in voluntary participating in the Project.[6] This distance was selected to account for transmission interconnect efficiency, which is essential to successful Project development. Siting the Project in close proximity to an existing substation allows Elk Creek to make efficient use of existing equipment, minimize line loss and avoid the need for large transmission construction. Elk Creek ultimately signed leases and/or purchase options with landowners that owned relatively flat, unobstructed, generally contiguous parcels of land, with limited environmental constraints directly adjacent to the Magnolia substation that were willing to host Project facilities; thereby reducing the need for new transmission infrastructure to a line that is currently estimated to be 300 feet, but in any event less than 1,500 feet.

[6] Elk Creek does not have the power of eminent domain. Therefore, any and all landowner participation in the Project is voluntary.

Image 1: Direct Normal Solar Resource of Minnesota



Source: NREL, 2017

2.3.2 Exclusion Area and Sensitive Environmental Features Avoidance Analysis

Within Rock and Nobles Counties, Elk Creek also evaluated several potential constraints during site selection to determine whether the Project has avoided other constraints to the maximum degree practicable and to determine which parcels should be avoided. These include transmission interconnection, willing landowners to sell or lease land for project facilities, and environmental constraints that may prohibit or make development more challenging.

Within Rock and Nobles Counties and five miles from the Magnolia substation, Elk Creek avoided parcels with environmental constraints that may prohibit or make solar development more challenging. These include parcels:

- owned or managed by a state or federal agency (i.e., state park, WMA, or Waterfowl Production Area);
- within a municipality;
- within 2 miles of an airport;
- with U.S. Fish and Wildlife Service (USFWS) designated critical habitat for Topeka shiner;
- with Minnesota Department of Natural Resources (MNDNR) Sites of Biodiversity Significance (SOBS);
- with MNDNR mapped native plant communities (NPC) and native prairie;
- with MNDNR Public Waters Inventory watercourses; and
- with MNDNR rare species records.

These constraints, and the parcels most suitable for solar development without these features, are displayed on Figure 7 (Potential Solar Development Constraints). As displayed on the Potential Solar Development Constraints map, Elk Creek has sited the Elk Creek Solar Project with voluntary leases and/or purchase options near a substation that avoids the sensitive resources identified above.

2.3.3 Prime Farmland Alternative Analysis

Southwestern Minnesota has a long history of agricultural activities, in part due to the nutrient rich soil (MNDNR, 2019a). In Rock County, approximately 91 percent of the soils are classified as prime farmland as defined under 7 CFR 657.5 paragraph (a). In neighboring Nobles County, approximately 92 percent of the soils are classified as prime farmland.

In consideration of Minnesota Rules 7850.4400 subp. 4, Elk Creek examined the soils located even farther from the substations than the initial five-mile selection criteria described above, and determined that a larger radius would not have resulted in decreased prevalence of prime farmland, while the increased distance would increase the necessary interconnection infrastructure. Prime farmland, and its sub-categories, are mapped throughout Rock and Nobles County except along larger waterway drainages and a bedrock outcropping associated with Blue Mounds State Park in Rock County (Figure 8 – Regional Prime Farmland). Accordingly, there is no area in the either county, let alone within an area within five miles of the Magnolia substation, that is conducive to solar development of approximately 700 acres that is not defined as prime farmland. Specifically, siting the Project in Blue Mounds State Park is expressly prohibited and siting the Project in a

floodplain or otherwise in or adjacent to a large water body is not practicable due to flooding risk and the risk of impacting positive environmental attributes generally found along riparian corridors in this portion of the state. Therefore, there is no feasible and prudent alternative available near the Magnolia substation or otherwise in Rock or Nobles County to construct the Project and not impact prime farmland. A finding that there is no feasible and prudent alternative to avoidance of prime farmland for the Project is consistent with past Commission decisions for large solar generating systems sited in prime farmland due to the fact that areas surrounding the project substation also contain similar amounts of prime farmland as the proposed site.[7]

Regardless, Elk Creek has voluntarily developed an AIMP (Appendix C) detailing methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation that will help to ensure the Project is designed, constructed, operated and ultimately decommissioned and restored in a manner allowing the land to be returned to its original agricultural use in the future. Moreover, conversion of the Preliminary Development Area to non-row-crop uses for the life of the Project may also have beneficial environmental impacts such as soil building, erosion control, habitat for wildlife, and protection of groundwater and surface water resources from nitrogen pollution (see Sections 4.5.3.1 and 2.3.4).

2.3.4 The Project May Reduce Nitrogen Pollution and Avoid Impacts to Sensitive Groundwater Resources

Nitrogen, in the form of fertilizer, is a critical component to agricultural productivity. However, nitrogen is a potent water pollutant that is very difficult to contain once it's been introduced into the environment. Elevated nitrate levels can be harmful to fish and aquatic life and pollute drinking water wells as it moves both in surface water and in groundwater. In Minnesota, concern about nitrates, from nitrogen fertilizer, in groundwater has been well documented (MDA, 2019a).

The primary human health concern for ingesting groundwater high in nitrates is with infants under six months old and pregnant women, as some contaminants can pass from mother to baby during pregnancy (MDH, 2019a). The toxic effects of nitrates in infants occur when bacteria in the stomach convert nitrate to more toxic nitrite, which reduces the capability of the blood to carry oxygen to the tissues, resulting in "blue baby syndrome" (methemoglobinemia). Most children over six months old and adults have enough stomach acid to inhibit growth of the bacteria which can cause the disease (MDH, 2018). If a drinking water well is contaminated to unsafe levels determined by the U.S. Environmental Protection Agency (10 milligrams per liter), the homeowner would temporarily need to find a safe source (i.e., bottled water) until a suitable permanent solution is provided.

A study by the Minnesota Pollution Control Agency (MPCA) found that more than 70% of nitrates in the Minnesota environment comes from cropland, the rest is from sources such as wastewater treatment plants, septic and urban runoff, forest, and the atmosphere (MPCA, 2013). Nitrate concentrations and loads in surface water are high throughout much of southern Minnesota, largely

[7] In the Matter of the Site Permit Application for the 100 MW Aurora Distributed Solar Energy Project at Multiple Facilities in Minnesota, PUC Docket No. E-6928/GS-14-515, Order Issuing Site Permit, As Amended (June 30, 2015); In the Matter of the Application of Marshall Solar, LLC for a Site Permit for the Marshall Solar Energy Project and Associated Facilities in Lyon County, PUC Docket No. IP-6964/GS-14-1052, Order Issuing Site Permit (May 5, 2016).

as a result of leaching through large areas of intensely cropped soils and into underlying drain tiles and groundwater. The MNDNR recently modeled pollution sensitivity of near-surface materials across the state (Adams, 2016). The model correlates the properties of soils and geology with travel time of water through 10 feet of geologic material. The travel time of water through the soil is proportional to the sensitivity of groundwater to pollution, where fast travel times result in high pollution sensitivity (Adams, 2016). Rock County, and the Land Control Area, are mapped as having moderate, low, and very low travel times ranging from a week to a year (Adams, 2016).

In addition to modeling the groundwater pollution sensitivity, the Minnesota Department of Agriculture (MDA) developed the Minnesota Nitrogen Fertilizer Management Plan (NFMP) as the state's blueprint for preventing or minimizing impacts of nitrogen fertilizer on groundwater. The NFMP was initially developed in 1990 and underwent a revision process from 2010-2014 (MDA, 2015). The updated plan calls for an assessment of nitrate conditions at the township scale. The MDA determines current nitrate-nitrogen concentrations in private wells, on a township scale, through the Township Testing Program. The MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production. Seven townships in Rock County were assessed in 2016, including Vienna and Magnolia Townships, which are within or immediately adjacent to the Land Control Area (MDA, 2019b). All seven townships sampled in Rock County have 10 percent or more of wells over the Health Risk Limit (HRL; $\geq$ 10mg/L Nitrate-N) for Nitrate-N, meaning nitrogen from fertilizer appears to be contaminating private wells, including drinking water (MDA, 2019b). More specifically, the Rock County report of testing in 2016 indicates nearly 51 percent of the 171 wells tests were over the health standard (MDA, 2016). Follow-up testing was to be completed in 2017 and a final report for Rock County available in 2018; that report is not available online (MDA, 2019c). MDA further notes in their June 2019 update that the Rock County townships had fewer than 20 wells in each township participate in the program, which the agency considers insufficient to fully characterize results at the township level. Regardless, it's clear that MDA identified these seven townships in Rock County as vulnerable to groundwater contamination based on significant row crop production and confirmed elevated levels of nitrogen in the private wells that were tested and the groundwater generally.

While nitrates in groundwater are a concern for water supply, a MPCA study found that 72% of the nitrogen load to surface water originates from agricultural sources (MPCA, 2013). This is of particular importance to the Elk Creek Solar Project as the Land Control Area is adjacent to Elk Creek (within 0.15 mile), which is designated by the USFWS as critical habitat for the federally endangered Topeka shiner. The current agricultural activities within the Land Control Area may be contributing to nitrate levels downstream in this valuable and protected waterway.

Minnesota state agencies and private organizations are working to address nitrogen levels by evaluating irrigation and fertilizer application practices. The MNDNR, local soil and water conservation districts, and the University of Minnesota are all evaluating irrigation strategy improvements centered around smarter irrigation. They are developing tools that assess soil moisture levels, crop stage (maturity), and precipitation received. Researchers are also evaluating the economics of subsurface irrigation. These strategies are designed to more efficiently water crops when and where they need it while conserving groundwater resources and limiting the vehicle (i.e., water deposits on the land) by which nitrogen can pollute groundwater.

Similarly, MDA is working to protect groundwater from agricultural contamination. The agency recently passed the Groundwater Protection Rule in late 2018 (MDA, 2019d). The two-part rule minimizes potential sources of nitrate pollution to the state's groundwater and protects drinking water. Part one of the rule restricts fall application of nitrogen fertilizer in areas vulnerable to contamination; part two outlines steps to reduce the severity of the problem in areas where nitrates in public water supply wells are already elevated, such as in Vienna Township.

While the State works to identify vulnerable areas for groundwater contamination and protect groundwater resources through a variety of programs, perhaps the most prudent method is to simply shift the cropping system on the vulnerable soils, as practicable, from a nitrogen-intensive row-crop agriculture to land cover that does not involve nitrogen applications. The Elk Creek Solar Project does just that by converting acres of nitrogen-intensive cropland to perennial vegetation that will not receive nitrogen application and further acts as a mechanism of capturing nitrogen and reducing the ability of that nitrogen to leave the Land Control Area (Christianson et al., 2016). Furthermore, nearby Elk Creek may also benefit from fewer nitrogen-intensive activities in its watershed that may reduce nitrogen inputs to this waterbody. Despite the fact that the Land Control Area is considered prime farmland, shifting the land cover in the Project area to perennial vegetation instead of row crops for the life of the Project, could prove to be beneficial for limiting nitrogen infiltration into groundwater supply and nitrogen runoff into Elk Creek, thereby improving groundwater and surface water quality.

2.4 Alternatives Considered but Rejected

Per Minn. Stat. 216E.04, Subd. 2(8), the Project qualifies for the alternative review process specified in Minn. R. 7850.2800-7850.3900. Accordingly, Elk Creek is not required to analyze alternative sites pursuant to 7850.3100. Elk Creek did not consider alternative sites other than the Project site because of the proximity of the site to electrical transmission infrastructure, a willing Project participant, optimal solar resource, and the minimal environmental impacts expected from the construction of the Elk Creek Solar Project at the Project site.

2.5 Cost Analysis

The total installed capital costs for the Project are estimated to be approximately $118 million, with Project cost depending on variables including, but not limited to, construction costs, taxes, tariffs, and panel selection, along with associated electrical and communication systems, and access roads. Costs associated with the various Project components are detailed in Table 2.5-1.

Table 2.5-1 Estimated Project Costs

Project Components	Cost
Engineering, Procurement, Construction Contractor	$96.4 million
Development Expense	$6.4 million
Interconnection	$10.4 million
Financing	$4.8 million
Project Total	**$118 million**

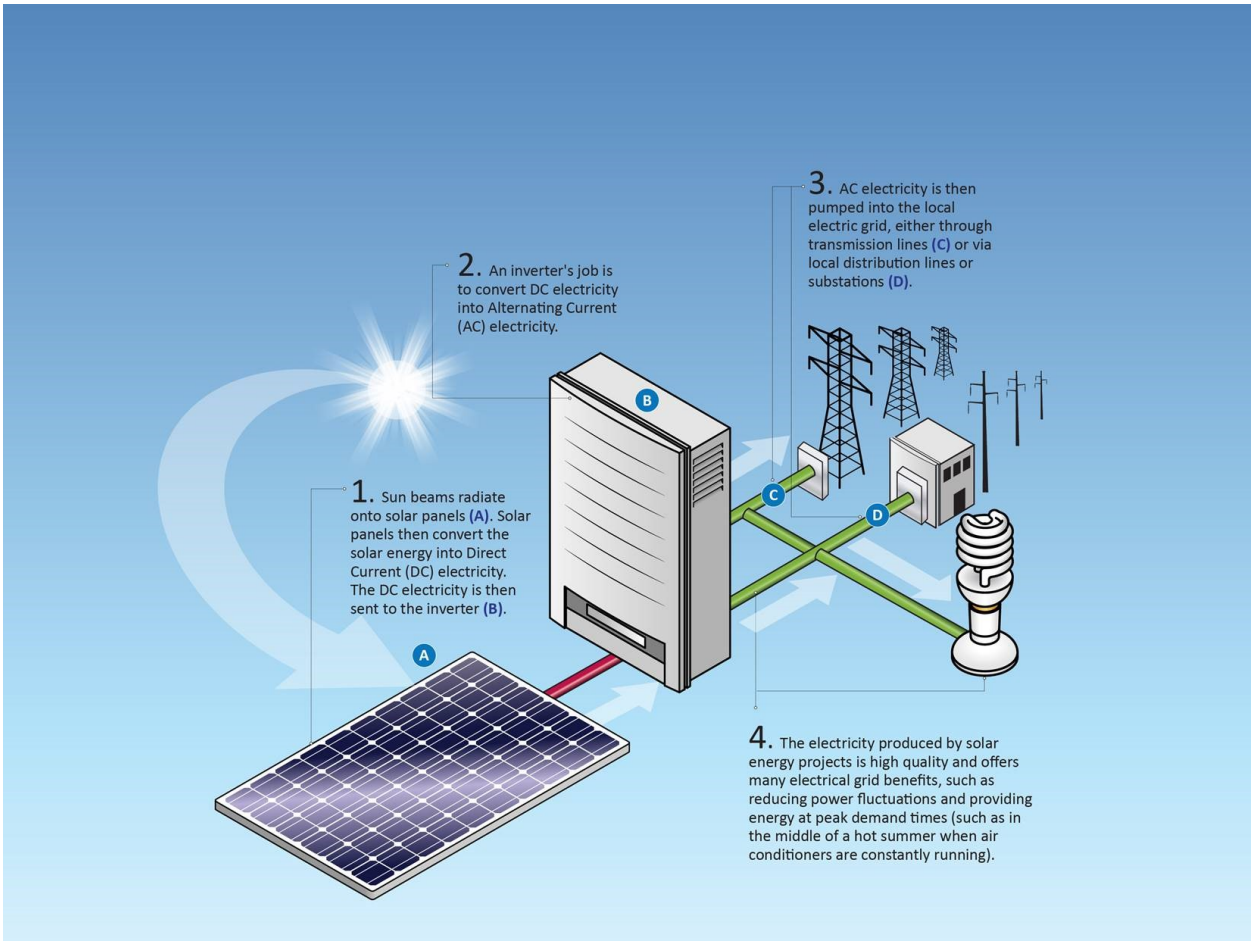
2.6 Future Expansion

Elk Creek's interconnection request is for 200 MW and Elk Creek plans to reduce the request to 80 MW to reflect the proposed nameplate capacity of the Project. The Federal Energy Regulatory Commission Order No. 845 and Order No. 845-A adopted provisions to enable a new interconnection customer to utilize or transfer surplus interconnection service which became effective May 20, 2019. Each public utility transmission provider must submit a compliance filing within 90 days of the effective date to comply with the orders. Once a process is established by MISO, Elk Creek may transfer a portion of its transmission service. Elk Creek does not anticipate expanding the proposed Project at this time. A separate project is under development, by another Geronimo subsidiary, adjacent to the Project; however, Elk Creek does not anticipate sharing any infrastructure with the adjacent project, aside from Project fencing, and the separate project will secure its own, leases, purchase options, interconnection agreement, and PPA.

3.0 ENGINEERING AND OPERATIONAL DESIGN

Image 2 below outlines the process of converting solar energy and connecting it to the transmission grid. The process begins with solar panels converting energy from sun into direct current (DC) electrical power. Sets of panels will be electrically connected in series and terminated at an inverter. The inverters will convert the DC power (approximately 1,500 volts) from the panels to AC power (650-950 volts depending on the inverter specifications). Next, a transformer will step up the AC voltage of generated electricity from the inverter output voltage to 34.5 kilovolt (kV). From the transformers, electrical cable will be buried below-ground, or pole mounted above-ground for routing to the Project substation where the electricity will be stepped up from 34.5 kV to 161 kV to interconnect to the existing transmission infrastructure.

Image 2: Harvesting Solar Energy



Source: Geronimo Energy, LLC

3.1 Design

The Project will utilize photovoltaic (PV) panels with tempered glass varying in size approximately 4 to 6.5 feet long by 2 to 3.5 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 3 below). Height may vary due to manufacturer, topography and vegetation constraints and could reach a height of approximately 20 feet from the ground. Depending on the technology selected, the PV panels may have an aluminum frame, 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. The solar array will occupy most of the Project site for the solar facilities.

3.1.1 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 a need for excavation or concrete to install the piers.

The footprint of the arrays is the same for the below-ground and hybrid below-ground / above-ground collection systems, but is slightly different for the above-ground collection systems (see Figures 3-6). The difference is a result of above-ground poles potentially casting shadows on the arrays. To avoid shadows on the arrays, for the above-ground electrical system, there is approximately 100 feet between the arrays and the access road located to the south of the arrays, and the above-ground collection line with poles is located on the south side of the access road parallel to the access road. As a result of the additional spacing requirements for an above-ground collection system, some arrays were shifted within the Preliminary Development Area. For example, in the layout using the above-ground collection system (Figure 5 – Above-Ground Preliminary Project Layout), arrays were shifted to an area utilized by a laydown area for the below-ground configuration in the east-central portion of the Preliminary Development Area (compare Figures 3 and 5 - Below-Ground Preliminary Project Layout and Above-Ground Preliminary Project Layout, respectively).

Images 3-5 below visually show the general racking equipment and dimensions of a linear axis tracking rack system.

Image 3: Tracking Rack System

Image 4: Approximate Tracking Rack System Dimensions

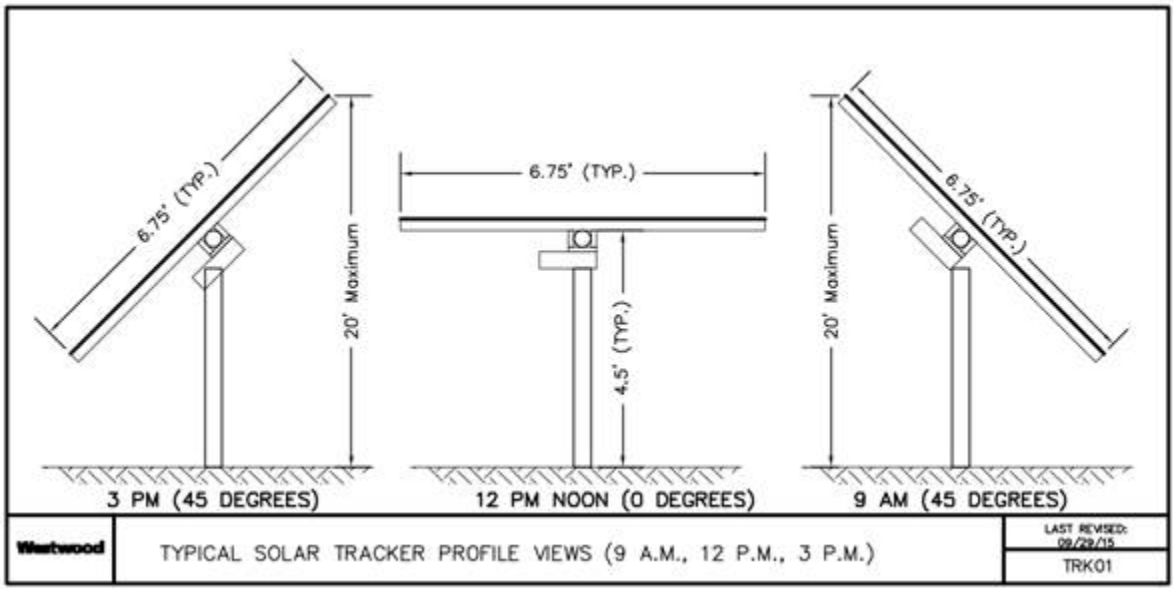


Image 5: Standard Steel Pier Foundations

3.1.2 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, above-ground, or a combination of both. The type of electrical system will be determined prior to construction based on technology, availability of materials, and costs. It should be noted that both the below-ground and above-ground collection systems are currently used at utility-scale solar projects. The inverters and electrical cables that would be used for each type of electrical collection system are described below.

3.1.2.1 Below-ground Electrical Collection System

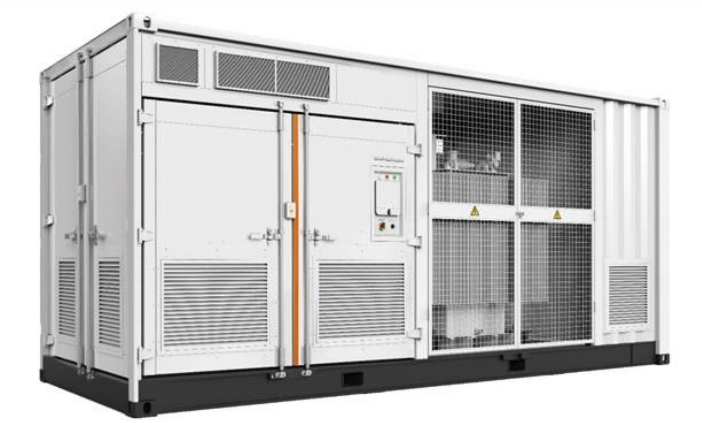
Inverters convert approximately 1,500 volts of DC output of the PV panels to between 650-950 volts of AC. Then a step-up transformer converts the inverter AC voltage to an intermediate voltage of 34.5kV. The panels deliver DC power to the inverters through cabling that will be located in a below-ground 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 in accordance with the Agricultural Impact Mitigation Plan (AIMP). Once the cables are laid in the trench, the area will be backfilled with subsoil followed by topsoil. Electrical collection technology is rapidly evolving and will be site-specific depending on geotechnical analysis, constructability, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system.

For below-ground cabling, inverter skids will be utilized at locations throughout the Preliminary Development Area and include a transformer to which the inverters will feed electricity (Image 6). 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 assumes below-ground cabling to represent the maximum potential impacts and has proposed 34 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 6). 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 6 below shows a central inverter and step-up transformer station.

Image 6: Typical Inverter and Transformer Station



3.1.2.2 Above-ground Electrical Collection System

An above-ground electrical system is being considered for the Elk Creek Solar 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 7. The electrical cables will then be routed below-ground at a minimum depth of at least four feet below grade to a distribution-type pole. These poles would be made of wood, approximately 18" in diameter, up to 30 feet in height, and spaced approximately 200 feet apart. Image 8 provides a schematic of the above-ground collection system components and configuration. The electrical cables will then be strung on poles to the Project substation. Above-ground medium voltage collection technology is rapidly evolving and, if utilized, the number of poles will be determined based on final engineering. Cables connecting each unit of solar arrays will be directionally bored under or spanned over county roads.

For above-ground cabling, inverter skids will be utilized at locations throughout the Preliminary Development Area and include a transformer to which the inverters will feed electricity (Image 6). 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 for above-ground cabling represents the maximum potential impacts and has proposed 34 central inverter skids (one inverter is required for every 2-3 MW). These skids provide the foundation for the inverter, transformer, and 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 6). 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 6 above shows a central inverter and step-up transformer station.

Image 7: Typical Above-Ground Collection Hanging Bracket

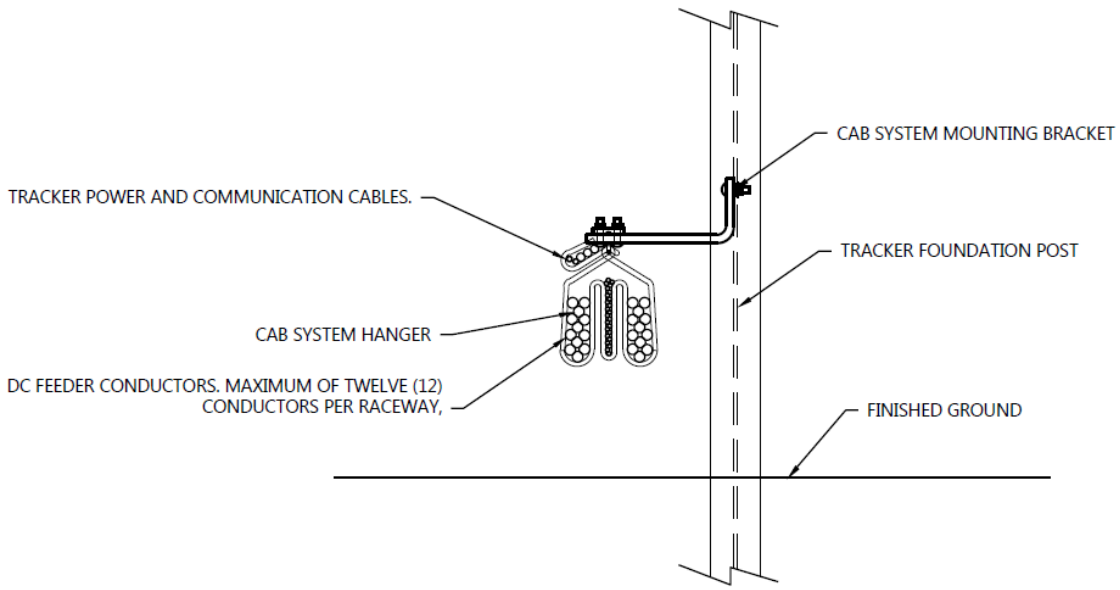
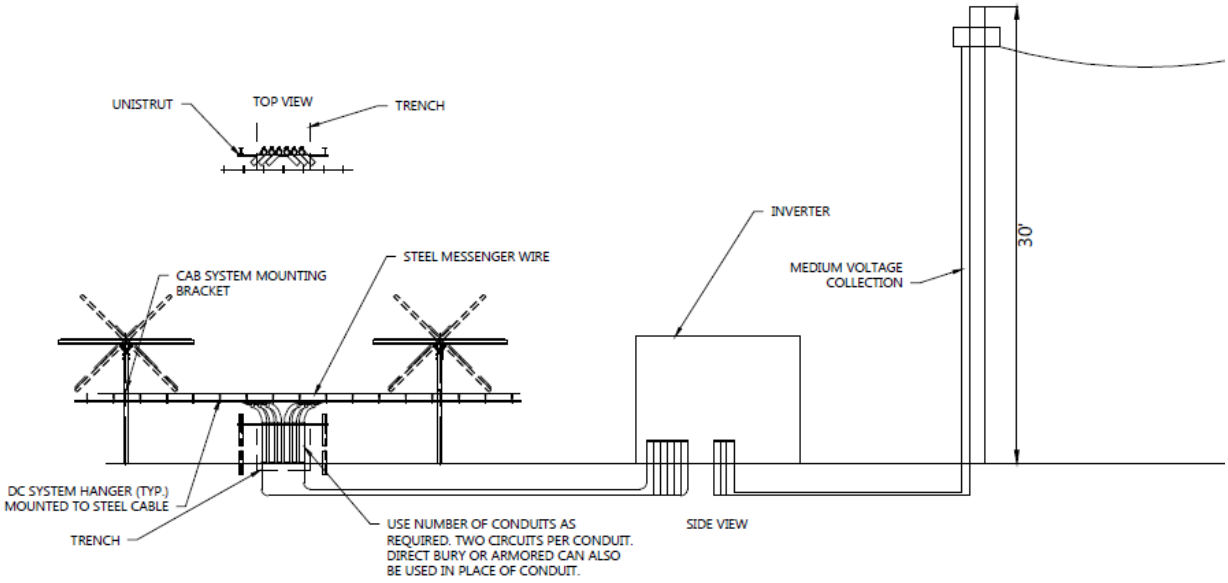


Image 8: Typical Above-Ground Collection System Components and Configuration



3.1.2.3 Hybrid Below-ground and Above-ground Electrical Collection System

A hybrid below-ground and above-ground electrical system is also being considered for the Elk Creek Solar Project for several reasons that are also advantageous to the above-ground electrical system, including ease of access for operations and maintenance, reduced ground disturbance, and cost considerations. Similar to the above-ground system, 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 above in Image 7. The electrical cables will then be routed below-ground at a minimum depth of at least four feet below grade to the Project substation. Cables connecting each unit of solar arrays will be directionally bored under county roads.

For the hybrid below-ground and above-ground cabling, inverter skids will also be utilized at locations throughout the Preliminary Development Area and include a transformer to which the inverters will feed electricity (Image 6). 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 for the hybrid below-ground and above-ground cabling represents the maximum potential impacts and has proposed 34 central inverter skids (one inverter is required for every 2-3 MW). These skids provide the foundation for the inverter, transformer, and 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 6). 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 6 above shows a central inverter and step-up transformer station.

3.1.3 Access Roads

The Project will include approximately 11.8 miles of graveled access roads that lead to the inverters and Project substation for operation and maintenance. 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 four access points to the Project from existing county roads. These entrances will have locked gates.

Elk Creek has included an access road around the perimeter of the Project for effective and efficient access for operations and maintenance and for safe ingress and egress of employees, visitors and emergency responders. Elk Creek has minimized the amount of access roads within the Preliminary Development Area. Prior versions of the site plan had access roads between every block of racking, which resulted in approximately 14.2 miles of access roads. The site plan included in this Application has removed ancillary access roads that don't provide direct access to inverters resulting in a nearly 17% decrease in the miles of access roads included in the Project design.

Some upgrades or other changes to the public roads may be required for construction or operation of the Project. Elk Creek will work with Rock 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. Road improvements may require a road use and repair agreement with Rock County and/or Vienna Township; Elk Creek will continue to coordinate with both agencies as the Project develops. Driveway changes will require a county entrance permit from Rock County, which will be obtained prior to construction.

3.1.4 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 an agricultural woven wire fence and will extend approximately 6 feet above grade. At the request of MNDNR, barbed wire will not be used around the perimeter of the Project, and instead one foot of 3-4 strands of smooth wire will be used. However, the fencing around the substation will be a 6-feet above grade chain-link fence and include one foot of barbed wire to comply with the National Electric Code. 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. Elk Creek will have security lighting at the entrances that will be down lit. The typical pole height will be ten feet and 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.

3.1.5 Associated Facilities

3.1.5.1 Project Substation

The Project substation will be a 34.5/161 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, Midcontinent Independent 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.

3.1.5.2 Operation and Maintenance Building

An O&M building will provide access and storage for Project maintenance and operations and will be located adjacent to the Project substation. The Project will obtain a building permit for the O&M building from Rock 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.

A SPCC Plan is required by the Environmental Protection Agency (EPA) if any facility associated with the Project (O&M 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 facility 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.

3.1.5.3 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 Rock County Planning and Zoning Ordinance. The parking lot will be gravel or paved depending on the size to comply with the parking and loading regulations detailed in Section 29 of the Rock County Planning and Zoning Ordinance (Rock County, 2000).

3.1.5.4 Stormwater Drainage Basins

Elk Creek has preliminarily designed 13 drainage basins throughout the Preliminary Development Area that range in size from 0.7 to 1.8-acre (see Figures 3-6). These basins are located in existing low areas that also contain hydric soils and for which the preliminary design for solar facilities has avoided. These areas will be vegetated with a wet seed mix that will help stabilize soils after rain events.

3.1.5.5 Weather Stations

The Project will include up to two weather stations up to 20 feet in height (see Image 9 below). Both weather stations will be within the Preliminary Development Area; the final locations will be determined following final engineering.

Image 9: Weather Station

3.1.6 Temporary Facilities

Elk Creek will utilize five temporary laydown areas within the Preliminary Development Area, totaling 17.6 acres for the below-ground configuration and 20.4 acres for the above-ground configuration. 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, the laydown areas will be reseeded as described in Section 4.5.6.

3.1.7 Transmission System

The Project will interconnect into the existing Magnolia Substation via a 161-kV overhead gen-tie transmission line of less than 1,500 feet. There will be a single dead-end structure within the Project substation and likely 2-3 additional structures to enter the Magnolia Substation with an overall length currently estimated to be approximately 300 feet, pending final engineering. 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. Per Minn. Stat. 216E.01 subd. 4, the transmission line does not meet the high voltage transmission line definition because it's less than 1,500 feet. As such, a separate route permit from the Commission will not be required for the gen-tie line.

3.1.8 Pipeline System

Minnesota Rules 7850.1900, subp. 1(J) is not applicable to the Project because no pipelines will be accessed or built as part of the Project.

3.2 Project Layout

The Project's final layout will optimize electrical generation and efficiency of the solar Project while avoiding and minimizing environmental, cultural, and infrastructure impacts. The Project's facilities will be sited to comply with the county's setback requirements, where applicable. To the extent applicable, the Project will also comply with all other local, state, and federal regulatory standards.

The setback regulations for solar energy systems in Rock County are provided in Table 3.2-1. Elk Creek will meet all county setbacks. Setbacks are displayed on the detailed Site Plan in Appendix B.

Table 3.2-1 Rock County Setback Requirements

Feature	Setback Requirement (feet) to solar array	Project Design (at closest)
Neighboring Property Lines (property lines within project boundary are exempt)	25'	61'
Non-participating residences	200'	220'
Road Right-of-Way	25'	71'
Public Conservation Lands	200'	The closest public conservation land is 3 miles west of the Project.

The Project's proposed components include PV panels mounted on a linear axis tracking system, inverters, transformers, and weather stations. The panels vary in size with approximate dimensions of 4 to 6.5 feet long by 2 to 3.5 feet wide, and 1 to 2 inches thick. The Project will use driven steel piles for the tracking and tracker system foundations. Geotechnical soil testing and pile pull testing will determine the final pile specifications and embedment depth requirements.

Sets of panels will be electrically connected in series and terminated at an inverter. The inverters will convert the DC power (approximately 1,500 volts) from the panels to AC power (650-950 volts depending on the panels). Next, a transformer will step up the AC voltage of generated electricity to 34.5 kV. From the transformers, electrical cable will be buried below-ground, or pole mounted above-ground for routing to the Project substation where the electricity will be stepped up to 161 kV to interconnect to the existing transmission infrastructure.

The Project will use a SCADA system, which allows remote control and monitoring of the status of the Project. The monitoring system provides status views of electrical and mechanical data, operation and fault status, meteorological data, and grid station data. For security, the Project will be fenced and have site security cameras. Access to the Land Control Area is through lockable gates.

3.3 Estimated Project Facility Acreages

Table 3.3-1 describes the Project facilities' estimated acreage within the 681-acre Preliminary Development Area based on the preliminary design for the below-ground, hybrid below-ground and above-ground and above-ground electrical collection configurations. For all three configurations, the Preliminary Development Area, inverters, Project substation, and O&M building are the same. However, as described in Section 3.1.1, the configuration of arrays and laydown areas are slightly different between the below-ground and hybrid system, which are essentially the same and the above-ground system.

Table 3.3-1 Estimated Project Facility Acreages within Preliminary Development Area

Project Facilities	Acres	
	Below-Ground Configuration	Above-Ground Configuration
Access Roads	23.2	23.2
Inverters	0.4	0.4
Project Substation and O&M Building	2.5	2.5
Laydown Areas	17.6 [1]	20.4 [1]
Solar Panels	628.2 [2]	625.4 [2]
Collection line between North and South Units	7.0	7.0
Unused area	2.3 [3]	2.3 [3]
Project Total	**681.2**	**681.2**

[1] The laydown areas are temporary impacts to be used only during construction.
[2] The impacts associated with solar panels include 13-foot-wide grass area between every row of panels
[3] This 2.3-acre area is within the Preliminary Development Area but not currently planned to host facilities

3.4 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:

- Pre-construction
  - Geotechnical analysis;
  - Design substation and electrical collection system;
  - Design solar array, access roads, and O&M building;
  - Underground utility discovery; and
  - 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; and
  - 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, and access roads;
  - Test facility; and
  - Begin commercial production.

3.4.1 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.

3.4.1.1 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 14 feet below grade, depending on soil properties and other factors.

3.4.1.2 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 2020 harvest season. Alternatively, and depending on construction timing, Elk Creek may plant a cover crop in Spring 2020 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.

3.4.1.3 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) in accordance with the Project's AIMP, as discussed in Section 4.2.8.3. Some grading will be required to provide a more level workspace and maintain soil stability in areas with a slope greater than five percent. Topsoil shall have temporary and permanent erosion control and soil stabilization measures established in accordance with the Project's Stormwater Pollution Prevention Plan (SWPPP). The earthwork activities will be completed using typical civil construction equipment – scrapers, bulldozers, front-end loaders, back-hoes or skid-steers.

3.4.1.4 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 Project 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.

3.4.1.5 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, 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 area. To the extent practicable, vehicular traffic will be limited to permanent and temporary access roads to minimize soil disturbance, mixing and compaction; however vehicular traffic will occur off of 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 throughout the Project area. Panels will be staged in advance throughout the Project area 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.

3.4.1.6 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 an above-ground or below-ground system. Above-ground DC collection cables will be strung under the panels on steel arms and a steel cable attached to the piles. The collection will hang on the steel cable with cable hangers and be pole mounted along access roads at the end of rows. If above-ground AC collection cabling is utilized, the poles will be wood, up to 18 inches in diameter and up to 30 feet in height. From the transformer, above-ground cables will be routed to the Project substation.

Below-ground AC collection systems will be installed in trenches or ploughed into place at a depth of at least four feet below grade. During trench excavation the topsoil and subsoil will be removed and stockpiled separately in accordance with the AIMP. Once the cables are laid in the trench, the area will be backfilled with subsoil followed by topsoil. Electrical collection technology is rapidly

evolving and will be site-specific depending on geotechnical analysis, constructability, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system.

3.4.1.7 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.

3.4.2 Construction Management

Elk Creek 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 Elk Creek'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.

3.4.3 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.

3.4.4 Restoration

Following construction, areas that will not contain permanent facilities (area under the arrays and the laydown yards) 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 MNDNR and include two native seed mixes: a low growing mix throughout the site and a wet mix for areas with hydric soils and/or susceptible to holding water based on field reviews (Appendix B – Site Plan). 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 outlines two vegetation maintenance strategies that may be implemented at the Project: mowing and grazing. Mowing may take the form of traditional mowing or haying, depending on Elk Creek preference and site feasibility. Should Elk Creek enter into a haying partnership for some or all of the site, seed mixes will need to be reviewed and potentially revised to meet local agricultural needs. Alternatively, Elk Creek 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 Elk Creek is considering for this Project.

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.

3.5 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 professionally maintained and operated by Elk Creek, an affiliate, or contractor. Primary tasks include scheduled monthly and quarterly inspection(s) of electrical equipment, vegetation management as well as snow removal on access drives.

The expected service life of the Project is 25 to 40 years, and Elk Creek 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 Elk Creek 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 3.5.5 during normal operations. The main scheduled activities are described in more detail below in Sections 3.5.2 through 3.5.4.

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 3.1.5.2. The generating facility will be operated through a real-time control system for most operations functions.

3.5.1 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 Elk Creek 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.

3.5.2 Equipment Inspection

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

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

3.5.3 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.).

3.5.4 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 and frequent precipitation).

3.5.5 Maintenance Schedule

Table 3.5-1 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 3.5-1 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)	Up to three times a year depending on site conditions
Electric Boards	Case visual check	Once Yearly
	Fuses check	Once Yearly
	Surge arresters check	Once Yearly
	Torque check	Once Yearly
	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

Table 3.5-1 Operations and Maintenance Tasks and Frequency		
Plant Device	**Task**	**Preliminary Frequency**
	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

3.5.6 Operations and Maintenance Building

As described above, the O&M building will be located adjacent to the Project substation. The O&M building will measure approximately 60 feet long by 40 feet wide and constructed of metal (similar to a pole barn). It will house the necessary equipment to operate and maintain the Project. 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 3.1.5.2.

3.6 Decommissioning and Repowering

At the end of the Project's useful life, Elk Creek 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. Decommissioning activities will include:

- Removing the solar arrays, transformers, electrical collection system, fencing, lighting and substations, and possibly the O&M building (the O&M building may be useful for other purposes);
- Removal of below-ground electrical cables to a depth of four feet (cables buried below four feet will be left in place);
- Removal of buildings and ancillary equipment to a depth of four feet;
- Removal of surface road material and restoration of the roads to substantially the same physical condition that existed immediately before construction. If the Project is decommissioned and the land sold to a new owner, Elk Creek would retain any access roads the new landowner requested be retained;
- Grading, adding or re-spreading topsoil, and reseeding according to the Natural Resources Conservation Service (NRCS) technical guide recommendations and other agency recommendations, areas disturbed by the construction of the facility or decommissioning activities, grading and soil disturbance activities will be kept to the minimum necessary to restore areas where topsoil was stripped in construction, topsoil in decommissioned roads and compaction only in areas that were compacted during decommissioning activities so that the benefits to the soil that were achieved over the life of the Project are not counteracted by decommissioning; and
- Standard decommissioning practices would be utilized, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements, and restoration.

3.6.1 Timeline

Decommissioning is estimated to take six to twelve months to complete and the decommissioning crew will ensure that all equipment is recycled or disposed of properly.

3.6.2 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 and wooden posts for the agricultural fence will be properly disposed; and
- Computers, monitors, hard drives, and other components: Sent to electronics recycler. Functioning parts can be reused.

3.6.3 Restoration/Reclamation of Facility Site

After all equipment is removed, the facility would be restored to an agricultural use, in accordance with the AIMP or to another use if the economic conditions at that time indicate another use is an appropriate use for the site. Holes created by steel pier foundations and fence poles, concrete pads, re-claimed access road corridors and other equipment will be filled in with soil to existing conditions and 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, such benefits include: building topsoil through plant matter decay, carbon capture, and beneficial, soil bacteria that are often absent from soil subject to row crop agriculture. This will include the revegetation.

Elk Creek reserves the right to extend operations instead of decommissioning at the end of the site permit term. 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. If the decision is made to continue operations, the Project will be re-permitted.

3.6.4 Financial Resource Plan

Beginning in year fifteen of the Project's operational life, Elk Creek will either create a reserve fund, enter into a surety bond agreement, create an escrow account, or provide another form of security that will ultimately fund decommissioning and site restoration costs after Project operations cease, to the extent that the salvage value does not cover decommissioning costs. The exact amount to be allocated for decommissioning will be determined by a third-party study in year fourteen that will assess the difference between estimated decommissioning costs and the salvage value.

4.0 ENVIRONMENTAL INFORMATION

For the discussion in the following sections, the following terminology, assumptions and approach are used.

For existing conditions within the portions of land under Elk Creek's control, calculations are based on the Land Control Area (976.4 acres). This reflects the fact that final design may necessitate development in areas within the overall area Land Control Area. Additionally, for any discussions of resources that are located outside of a facility (such as parks within one mile), the Land Control Area boundary is used in order to discuss the vicinity of these features from anywhere within the portion under Elk Creek's control.

For approximating areas of temporary impact, the Preliminary Development Area is used (approximately 681 acres); this reflects the possibility for resources to be temporarily impacted within the area that preliminary design indicates is needed for construction and operation of the facility. For some resources, such as land cover, and agricultural production or other land uses, the Preliminary Development Area is also referred to for "permanent impacts" discussions (i.e., "permanent" for the life of the Project). For calculating anticipated permanent impacts for resources such as wetlands, the permanent impacts are calculated using the preliminary design for permanent solar array components such as access roads and inverters. It should be noted that preliminary design does not identify locations of the posts for the solar arrays, so detailed calculations of impacts are not included. However, due to the fact that the posts of the solar arrays are anticipated to be installed via vibration or a pile driver for the majority of the locations, the permanent impacts associated with these features are expected to be negligible. To illustrate, the I-beam shaped posts are anticipated to be approximately 6 inches by 4 inches, with a surface area of approximately 8 square inches because the I-beam is approximately 0.25-inches thick within the 6-inch by 4-inch I-shaped configuration. Similarly, the footprint for 185 18-inch diameter wooden poles for the above-ground electrical configuration is not included in the detail calculations. The footprint for these poles is 327 square feet or 0.008 acre.

4.1 Environmental Setting

The MNDNR and the U.S. Forest Service have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota that is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (MNDNR, undated). Through the ECS, the State of Minnesota is split into Ecological Provinces, Sections, and Subsections. The Project is located within the North Central Glaciated Plains Section of the Prairie Parkland Province (251B). The Project is located in the Inner Coteau ecological subsection.

The Inner Coteau subsection is part of a high glacial landform occupying southwestern Minnesota, southeastern South Dakota, and northwestern Iowa. It is topped by Buffalo Ridge at 1995 feet above sea level in Pipestone County, which is the adjacent county to the north of Rock County. The high elevation is caused by thick deposits of pre-Wisconsin age glacial till. The depth to bedrock in this subsection is up to 800 feet through glacial till; however, there are exposures of bedrock in Rock County. Soils are loamy and well-drained with thick dark surface horizons. Annual precipitation in the Inner Coteau subsection ranges from 24 inches in the west to 27 inches

in the east and the average growing season lasts approximately 145 to 150 days in length. Windy conditions are common in this subsection. Prior to Euro-American settlement, vegetation in this subsection was predominantly tallgrass prairie, with wet prairies and forest restricted to ravines along a few streams. Currently land used in this subsection is agricultural activity; there are few remnants of pre-settlement vegetation left (MNDNR, 2019a).

The Project is located in a rural area approximately 1.5 miles north of Magnolia and 4.5 miles northeast of Luverne. Residences are scattered throughout the rural area where the land use is dominated by agricultural fields, predominately corn planted in row crops. With the exception of County State Aid Highway (CSAH) 3, which forms the eastern boundary of the Project, roads that surround the Land Control Area are local county or township roads. The Land Control Area is bordered on the north by 151st Street, bordered on the south by 131st Street and bisected by 141st Street. Similarly, the Land Control Area is bordered by 180th Avenue on the west, CSAH 3 on the east, and bisected by 190th Avenue. The Magnolia substation is immediately adjacent to the central portion of the Land Control Area with two transmission lines at least partially within portions of the Land Control Area. The Project is located on relatively flat fields conducive to solar development.

4.2 Human Settlement

4.2.1 Public Health and Safety

The Project is in rural Vienna Township which according to the 2010 U.S. Census, has a population density of 4.3 persons per square mile of land area (U.S. Census Bureau, 2010). If emergency personnel were needed at the Elk Creek Solar Project, multiple agencies would likely respond, depending on the situation. These include the Rock County Sheriff, Magnolia volunteer fire department, and services from Luverne including the fire department, Sanford Luverne Medical Center ambulance, and police department, all of which are approximately 4.5 miles southwest of the Project.

There are four towers that are a part of the Allied Radio Matrix for Emergency Response (ARMER) in Rock County (Minnesota Department of Public Safety, 2018). These ARMER towers are a part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders. The ARMER radio system operates by line of sight, talking to other ARMER towers. In order for the system to operate effectively, multiple towers are needed to produce a solid blanket of coverage. The system can be interrupted if tall objects are proposed within the line-of-sight, typically at or near the top of a tower over 150 feet tall. There are no ARMER towers within one mile of the Elk Creek Solar Project; the nearest ARMER tower is located in the city of Luverne, which is 4.5 miles southwest of the Land Control Area (Minnesota Department of Public Safety, 2018).

4.2.1.1 Impacts and Mitigation

Construction and operation of the Project will have minimal impacts on the security and safety of the local populace. Elk Creek is gathering information to coordinate with all emergency and non-emergency response teams for the Project, including law enforcement agencies (Rock County Sheriff, Magnolia volunteer and City of Luverne fire departments), Luverne police department,

and ambulance services from Sanford Luverne Medical Center and 911 services. The type and number of responding agencies will depend on the incident requiring emergency services. Elk Creek 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.

While there are ARMER towers in the Project vicinity (i.e., within 2.2 miles), the Elk Creek Solar Project will not impact this communication system as Project facilities are proposed well below the typical height of a tower and line-of-sight near the top of these towers (i.e., greater than 150 feet above ground). Elk Creek anticipates the tallest solar facilities and transmission facilities to be approximately 30 feet and up to 150 feet above ground, respectively. As such, no mitigation is proposed.

4.2.1.2 EMF

The term electromagnetic field (EMF) refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from the voltage or electrical charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, power collection lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors (wire). EMF can occur indoors and outdoors. The general consensus is that electric fields pose no health risk to humans (National Radiation Laboratory, Ministry of Health, New Zealand, 2008).

With the proposed Project, the sources of EMF will be from electrical collection lines, either buried below-ground or hung above-ground, the gen-tie transmission line, and from the transformers installed at each inverter. EMF from electrical collection lines, regardless of whether they are below-ground or above-ground, transmission lines, and transformers dissipates rapidly with distance from the source (National Institute of Environmental Health Sciences [NIEHS], 2002). Generally speaking, higher voltage electrical lines produce higher levels of EMF at the source before dissipating with distance. The internationally accepted guideline for the general public exposed to electric fields is 4.2 kV/m and 833 milliGauss (mG) for magnetic fields (NIEHS, 2002).

4.2.1.3 Impacts and Mitigation

Levels of EMF from the Project will be considerably below acceptable guidelines. Project-specific EMF levels were not modeled for the 34.5 kV electrical collection lines, 161 kV overhead gen-tie transmission line, or inverters and transformers. However, several studies have documented EMF exposure of various high voltage transmission lines. The National Institute of Environmental Health Sciences provides typical EMF levels for power transmission lines (NIEHS, 2002). For 161 kV transmission lines, the lowest voltage with typical EMF levels reported in the study, electric fields directly below the transmission line were reported at 1.0 kV/m before dissipating to 0.5 kV/m at 50 feet (approximate edge of right-of-way). Similarly, average magnetic fields

directly below the transmission line were reported at 29.7 mG before dissipating to 6.5 mG at 50 feet (NIEHS, 2002). A Canadian study of collection lines at a wind facility measured EMF of the Project's 27.5 kV collection lines, slightly lower voltage than the electrical collection lines proposed for the Project. This study found magnetic fields associated with buried electrical collection lines to be within background levels at 1m above ground and up to 16.5 mG directly beneath overhead 27.5 kV lines (McCallum et al., 2014). As demonstrated here, both electric and magnetic fields will be well below the international guidelines of 4.2 kV/m and 833 mG, respectively. Additionally, since the transformers are enclosed in a grounded metal case (shielded), they typically do not emit much EMF.

Stray voltage is often a concern in agricultural areas, particularly dairy farms. Stray voltage is an unintended transfer of electricity between two grounded objects, and is typically caused by improperly grounded electrical equipment in farm buildings or by a faulty utility connection. All electrical components in the Project, including inverters and transformers, will be grounded in accordance with National Electric Safety Code. Soil resistivity measurements will be taken on site as part of the Project's geotechnical analysis, and that data will be used to help design grounding systems. For these reasons, the potential for stray voltage as a result of the Project will be negligible. Should a fault occur during operation of the Project, it would be quickly identified by Project monitoring systems and corrected.

The nearest residence to solar arrays is 220 feet and 788 feet to the nearest inverter, electrical collection line, and transformer (see Table 4.2-4 in Section 4.2.4 and Figures 3 and 5). At this distance, both electric and magnetic fields would have dissipated to background levels. As such, impacts will be negligible and mitigation measures are proposed.

4.2.2 Displacement

There are no residences, business, or structures such as barns or sheds within the Land Control Area. There is one grain bin within the northern portion of the Land Control Area at a field edge along 141st Street.

4.2.2.1 Impacts and Mitigation

Elk Creek has coordinated with the landowner of the grain bin, who has agreed to its removal as part of the Project. Because there are no building structures in the Land Control Area, there will not be any displacement; as such, no mitigation is proposed.

4.2.3 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. According to ANSI/ASA S12.9-

2013/Part 3, rural residential areas have a typical daytime noise level of 40 dBA and a typical nighttime noise level of 34 dBA.

Background noise in the vicinity of the Project facilities is typically a result of farming equipment/operations, wind, and vehicles. A comparison of typical noise-generating sources is outlined below in Table 4.2-1.

Table 4.2-1 Common Noise Sources

Sound Pressure Level (dBA)	Common Noise Source
110	Rock band at 5 m
100	Jet flyover at 300 m
90	Gas lawn mower at 1 m
85	Food blender at 1 m
75	Shouting at 1 m
70	Vacuum cleaner at 3 m
60	Normal speech at 1 m
55	Large business office
50	Dishwasher in next room, quiet urban daytime
40	Library, quiet urban nighttime
30	Bedroom at night
20	Quite rural nighttime
0	Threshold of hearing

Source: MPCA, 2008

The MPCA has the authority to adopt noise standards pursuant to Minnesota Statute Section 116.07, subd. 2. The adopted standards are set forth in Minnesota Rule Chapter 7030. The MPCA standards require A weighted noise measurements. Different standards are specified for daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) hours. The noise standards specify the maximum allowable noise volumes that may not be exceeded for more than 10 percent of any hour (L10) and 50 percent of any hour (L50). Household units, including farmhouses, are included in Noise Area Classification 1. Table 4.2-2 shows the MPCA state noise standards.

Table 4.2-2 MPCA State Noise Standards - Hourly A-Weighted Decibels

	Daytime (7:00 a.m. – 10:00 p.m.)		Nighttime (10:00 p.m. – 10:00 a.m.)	
Noise Area Classification	L_{10}	L_{50}	L_{10}	L_{50}
1 – Residential	65	60	55	50
2 – Commercial	70	65	70	65
3 - Industrial	80	75	80	75

Source: Minn. R. § 7030.0040

4.2.3.1 Impacts and Mitigation

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 (see Section 4.2.4 for locations). 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. Elk Creek 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; Elk Creek anticipates this activity will take up to 8 weeks across the site. Finally, installation of the solar panels on the tracking similar 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. As stated above, 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 inverters, which includes the air conditioners housed in each, and to a lesser extent from the transformers and rotation of the tracking system. Table 4.2-3 summarizes the anticipated distance to reach the most stringent MPCA noise standard (50 dBA) from a range of inverters and trackers under consideration for use at the Elk Creek Solar Project. Table 4.2-3 also provides the dBA at 50 feet so noise levels can be calculated at greater distances.

Table 4.2-3 Inverter and Tracker Noise Levels

Facility Type	Equipment Model	Distance to 50 dBA	dBA at 50 feet
Inverter	TMEIC Solar Ware Ninja PVU-L0920GR	58 feet	51
	SMA Sunny Central 2750-EV-US	160 feet	60
	ABB PVS980	260 feet	64
Tracker	ATI DuraTrack HZ v3	5 feet	30
	NexTracker	82 feet	54

The results of noise modeling conducted by technology manufactures outlined in Table 4.2-3 show that noise levels will be less than 50 dBA between 58 and 260 feet from the inverter, depending on which model is selected. Similarly, noise levels will be less than 50 dBA between 5 and 82 feet from the trackers, depending on which model is selected. As such, the Project has been designed to meet the nighttime L50 dBA noise standard, as the closest home to the facility is 220 feet away from the edge of a solar array. Further, because the inverters are typically located within the middle of the solar arrays, the noise levels from Project equipment are not expected to be discernible from background noise levels at homes in the vicinity. The distance of the nearest inverter to a residence is 788 feet.

During construction, Elk Creek plans to limit construction to daylight hours. No noise impacts are anticipated during operation; therefore, no mitigation measures are proposed.

4.2.4 Aesthetics

The topography of the Land Control Area is generally flat with elevations ranging from 1530 to 1550 feet above sea level. As discussed in Section 4.1, land use within the Land Control Area is predominantly agricultural, with corn and beans being the most common crops. There are windbreaks around most farmsteads and former farmsteads with agricultural buildings still present in the Project vicinity. The existing Magnolia substation is located adjacent to the Land Control Area. Additionally, there are two transmission lines within or adjacent to the Land Control Area (see Figures 3 and 5 (Below-Ground Preliminary Project Layout and Above-Ground Preliminary Project Layout, respectively).

A 161-kV line runs east-west through Section 35 out of the Magnolia substation and bisects the easternmost portion of the Land Control Area. A 69-kV transmission line exits the Magnolia substation and runs south along 190th Avenue before turning east along 131st Street. This transmission line is partially within the Land Control Area along portions of both roads. The transmission lines and substation are the current man-made focal points.

There are no residences or businesses within the Land Control Area; however, there are four residences and several agricultural buildings on parcels adjacent to the Land Control Area (see Figures 3 and 5 (Below-Ground Preliminary Project Layout and Above-Ground Preliminary Project Layout, respectively).Table 4.2-4 provides distances to the nearest homes to the Project, including approximate distance to the Preliminary Development Area boundary and approximate distance to the edge of solar arrays (per preliminary design).

Table 4.2-4 Proximity of Residences to Elk Creek Solar Facility

Residence	Distance to Development Boundary (feet)	Distance to Solar Arrays (feet) [1]	Distance to Nearest Inverter (feet) [1]
A	169	220	788
B	1,262	1,302	1,917
C	668	711	1,328
D	3,182	3,445	3,965

[1] Based on preliminary design.

Residence A is located adjacent to the northwest portion of the Land Control Area west of 180th Avenue. This residence has existing vegetative screening around three sides of the farmstead, including east side adjacent to the Project.

Residence B is located adjacent to the southwest portion of the Land Control Area. The residence faces southeast and has existing vegetative screening along the west and north sides of the farmstead.

Residence C is located adjacent to the southeast portion of the Land Control Area south of 131st Street. The residence faces southeast and has existing vegetative screening along the west and north sides of the farmstead.

Residence D is located adjacent to the northwest portion of the Land Control Areas east of Highway 3. The residence is screened on all sides within the farmstead.

4.2.4.1 Impacts and Mitigation

The Project will convert approximately 669.0 acres of predominately agricultural land (see Table 4.2-6 in Section 4.2.8 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 Preliminary Development Area will be utilized with 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 3.1.1 provide a reference for how the Elk Creek Solar 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.

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. The Project substation will be of similar vertical profile as the existing Magnolia Substation adjacent to the Land Control Area. In the above-ground electrical configuration, poles would be up to 30 feet in height and predominately parallel access roads. From outside the facility, these poles would be most visible from existing roadways. Most poles on the interior of the facility would not be visible outside the facility due to a combination of line of sight with other components (arrays, inverters), distance from observer, and existing vegetative screening around residences.

The 2-3 transmission structures of less than 150 feet in height will be limited to the area between the proposed Project substation and the existing Magnolia substation, approximately 300 feet apart. This area already hosts two transmission lines (see Section 4.2.9 and Figure 11 – Existing Infrastructure and AADT). These structures will be visible from the local roadways, but will be one-half mile from the nearest residence (Residence B – see Figures 3 and 5 – Below-Ground Preliminary Project Layout and Above-Ground Preliminary Project Layout, respectively).

The solar arrays will be visible from adjacent roadways and parcels but given their relative low profile and the fact that all the facilities will be fenced for security, they will not be visible from long distances. Additionally, Elk Creek has designed the Project to avoid tree clearing. As previously mentioned, the closest residence to preliminary design is approximately 220 feet immediately adjacent to the west side of the Preliminary Development Area. Elk Creek has coordinated with the owners of Residences A, B, C and D and they have not expressed concerns with the Project. While Residence A has existing vegetative screening along the east side of their residence, Elk Creek has coordinated with the landowner and will implement approximately 150 feet of vegetative screening to help screen the south facing home from southeasterly views of the

solar facility. The landowner has requested apple trees as the vegetative screening mechanism (see Appendix B).

A rendering of the proposed Project from 180th Avenue on the west side of the Project is provided below in Image 10 for the below-ground configuration and Image 11 for the above-ground configuration.

Image 10: Visual Rendering of Elk Creek Solar Facility from 180th Avenue (below-ground configuration)

Image 11: Visual Rendering of Elk Creek Solar Facility from 180th Avenue (above-ground configuration)

Operation of the Project will require down lit security lighting at the entrance of the Project and there will be down lit, switch controlled lights at each inverter for repair purposes. Impacts to light-sensitive land uses are not anticipated given the rural Project location coupled with minimal required lighting for operations.

4.2.5 Socioeconomics

The Project is in a rural area within Vienna Township and no incorporated communities are located within the Land Control Area. The incorporated communities that are geographically closest to the Land Control Area are Magnolia (1.5 miles south), Kenneth (3.0 miles north/northwest), Luverne (4.5 miles southwest), Hardwick (5.6 miles northwest), and Adrian (6.9 miles southeast). The nearest metropolitan area is Sioux Falls, South Dakota which is approximately 29 miles southwest of the Project.

Table 4.2-5 presents population and economic information gathered from the U.S. Census Bureau 2010 Census and 2013-2017 American Community Survey 5-year Estimates about Minnesota and Rock County (U.S. Census Bureau, 2010 and 2017). The 2010 U.S. Census gathered a wide variety of data points. The discussion herein does not address every socioeconomic measure, but instead addresses the most applicable statistics related to the Project. The socioeconomic statistics that best characterize the demographic and economic context of the Land Control Area, and represent the socioeconomic characteristics that potentially could be affected by construction and operation of the Project, include: total population, vacant housing units, per capita income, the percentage of the population below poverty level, and the unemployment rate (see Table 4.2-5).

Based on the 2010 U.S. Census, the population of Rock County is 9,687 persons, which represents less than 1 percent of the total population of Minnesota. The per capita income of Rock County is $29,000, which is lower than the state average. The unemployment rate in Rock County (1.9 percent) is significantly lower than the state average of 4.3 percent; however, the percentage of individuals classified as living below the poverty level in Rock County is similar to the state average at 11.0 percent and 10.5 percent, respectively. The primary industries in Rock County are classified as educational services, health care, and social assistance (25.8 percent), followed by retail trade (12.1 percent), and manufacturing (11.2 percent) and (U.S. Census, 2017).

According to the U.S. Census Bureau 2013-2017 American Community Survey 5-year Estimates, approximately 344 vacant housing units exist in Rock County. In the nearest metropolitan area, Sioux Falls, South Dakota, there are approximately 4,576 vacant housing units (U.S. Census Bureau, 2017). In addition, according to the Visit Sioux Falls website (visitsiouxfalls.com, 2019) 58 hotels and motels, three bed and breakfasts, and five campgrounds are available in the greater Sioux Falls area. These residence and temporary housing statistics suggest the local area could support an influx of construction workers, if needed.

Table 4.2-5: Socioeconomic Characteristics of the Project Vicinity					
State/County	Total Population (2010)	Vacant Housing Units	Per Capita Income (U.S. Dollars)	Individuals Below Poverty Level (percent)	Unemployment Rate (percent)
Minnesota	5,303,925	259,974	34,712	10.5	4.3
Rock	9,687	344	29,000	11.0	1.9

Sources: U.S. Census Bureau, 2010 and 2017.

4.2.5.1 Impacts and Mitigation

The Project is designed to be socioeconomically beneficial to the landowners, local governments, and communities. Landowner compensation is established by voluntary leases or purchase agreements between the landowners and Elk Creek for Elk Creek's lease or purchase of the land. Elk Creek will also establish the Elk Creek Education Fund, to which Elk Creek will contribute $16,000 annually for the first 20 years of Project operation. Because the Project is located within the Luverne school district, the fund will be distributed to this district. Elk Creek will continue to coordinate with the school district on establishing the fund as the Project develops.

Construction of the Project would provide temporary increases to the revenue of the area 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.

General skilled labor is expected to be available in Rock County or Minnesota 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 Minnesota or neighboring states because the relatively short construction duration often precludes special training of local or regional labor and much of the workforce needed to construct a solar facility must be comprised of Minnesota licensed electricians because most of the assembly and wiring work for solar installations is considered electrical work under the Minnesota 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. The operations and maintenance of the facility will require approximately four long-term personnel. The Project anticipates that sufficient temporary lodging and permanent housing will be available within Rock County, and within the Sioux Falls metropolitan area, to accommodate construction laborers and long-term personnel.

In general, the socioeconomic impacts associated with the Project will be positive; therefore, no mitigative measures are proposed. Wages will be paid, and expenditures will be made to local businesses and landowners during the Project's construction and operation. The Project will provide production tax payments to Rock County of approximately $144,000 annually over 25

years. Additionally, Vienna Township will receive approximately $36,000 annually over 25 years. In addition, lease and purchase payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.

4.2.6 Cultural Values

Cultural values include those perceived community attitudes or beliefs that provide a framework for community unity. The Project is in Rock County, Minnesota and according to the U.S. Census Bureau (2010), the majority of the population in Rock County identifies as Caucasian with an ethnic background of European origin. Cultural representation in community events appears to be more closely tied to geographic features (such as Blue Mound State Park), seasonal events, national holidays, and municipal events than to those based in ethnic heritage. Examples of regional cultural events include summertime events like Buffalo Days and the Rock County Fair hosted by the City of Luverne (luverneevents.com 2019).

4.2.6.1 Impacts and Mitigation

Construction and operation of the Project would not impact public participation in the regional community cultural events noted above, as the Land Control Area is located outside of municipal areas. Therefore, no impacts to cultural values are anticipated and no mitigation measures are proposed.

4.2.7 Recreation

There are no MNDNR Scientific and Natural Areas, state trails, state water trails, WMAs, Aquatic Management Areas, state parks, migratory waterfowl feeding and resting areas, or MNDNR mapped snowmobile trails within one mile of the Land Control Area. The nearest MNDNR WMA is the Rock River WMA, located 3 miles west of the Land Control Area; and the nearest state park is the Blue Mounds State Park, also located 3 miles west of the Land Control Area (Figure 9 – Recreation). There are several other managed lands associated with the Rock River west of the Land Control Area and near Luverne including: Stephen WMA, Russ Blanford WMA, P.F. Mulder WMA, and the Stephens Aquatic Management Area.

Similarly, there are no county or city parks within one mile of the Land Control Area. The nearest city is the City of Magnolia, whose municipal boundary is located 1.5 miles south of the Land Control Area.

4.2.7.1 Impacts and Mitigation

Construction and operation of the Project would not impact any recreational opportunities in or near the Land Control Area. Therefore, no impacts to recreational opportunities are anticipated and no mitigation measures are proposed.

4.2.8 Land Use and Zoning

4.2.8.1 Land Use

The Project is located within a rural landscape, and as such the primary land use in the Land Control Area is agricultural (96.1 percent; U.S. Geological Survey [USGS], 2011; Table 4.2-6; Figure 10 - Land Use). The remainder of the Land Control Area consists of developed land (3.4 percent) and a small amount of forested land (0.3 percent) and shrubland (0.2 percent). Most of the agricultural land in the Land Control Area is subject to row-crop agriculture, such as corn and soybeans. Developed land within the Land Control Area generally consists of public roads, namely 190th Avenue and 141st Street. Forested land is a category in the U.S. Geological Survey (USGS) Gap Analysis Program (GAP) data used for Elk Creek's environmental analysis; however, forested land within the Land Control Area consists of a woodlot shelterbelt on the north and west sides of a former farmstead. The small area (1.6 acre) of shrubland within the Land Control Area is associated with roadside ditches. There are no wetlands or open water identified in the Land Control Area by the USGS GAP data. See Section 4.5.5 for more information on wetlands.

Table 4.2-6 Land Use Within the Land Control Area

Land Use Type	Acres in Land Control Area	Percent of Total Acreage
Agricultural	938.4	96.1%
Developed	33.0	3.4%
Forested	2.9	0.3%
Shrubland	1.6	0.2%
Total	**975.9**	**100.0%**

Source: USGS, 2011

Farmsteads are sparsely scattered throughout the Project vicinity, generally situated near public roads. Based on review of available aerial photography, there are four occupied or occupiable residences located on parcels adjacent to the Land Control Area; however, the Project will not cause displacement or relocation of residences (see Section 4.2.2).

4.2.8.2 Zoning

Based on Rock County zoning data, the Land Control Area is zoned as general agricultural (Rock County Zoning Map, 2018). As noted in Section 7 of the Rock County Renewable Energy Ordinance (Renewable Energy Ordinance), development of large solar energy systems within the general agricultural district is a conditionally permitted use (Rock County, 2018). The Rock County Renewable Energy Ordinance applies to solar energy systems that are not otherwise subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act (Minnesota Statute 216E); because the Project requires a Site Permit from the State of Minnesota, the Rock County Renewable Energy Ordinance does not apply (Rock County, 2018), but Elk Creek has applied county standards to the Project when practicable. As mentioned in Section 3.2, the Project complies with the Rock County setbacks for large solar energy systems. The Renewable Energy Ordinance also outlines standards for large solar farms and solar facilities in general. The Project differs from the Renewable Energy Ordinance in height of panels ("ground-or-pole-mounted solar systems shall not exceed 15 feet in height when oriented at

maximum tilt"; Section 10, subdivision 4, part 2B) and power and communication lines ("…shall be buried underground"; Section 10, subdivision 3, part 5). As outlined throughout this Application, Elk Creek is evaluating both above-ground and below-ground electrical systems. An above-ground system, or a hybrid above-ground and belowground system have many benefits, including less soil disturbance (i.e., fewer cables need to be installed belowground), thereby minimizing the construction impacts and preserving the soil structure for future agricultural uses after decommissioning. The exact dimensions of an above-ground system will be dependent upon the technology available at the time of construction, but is anticipated to have electrical poles up to 30 feet above the ground surface. Similarly, solar panels are rapidly evolving, and the size of the panels used to the Project will depend on the technology available at the time of construction, which may have a maximum height up to 20 feet above ground. Elk Creek discussed these two potential design differences of the Project from the Ordinance with Rock County on July 31 and September 12, 2019. Rock County continues to support the Elk Creek Solar Project.

4.2.8.3 Land Use and Zoning Impacts and Mitigation

Table 4.2-7 provides the total acres of each land use type within the Preliminary Development Area. Based on the USGS GAP landcover data, the Project would affect predominately agricultural land (98.4 percent). Impacts to developed and shrubland land use types within the Preliminary Development Area total 1.6 percent. While in the Preliminary Development Area, Elk Creek will not impact developed land. Solar facilities will be setback from the two roads that bisect the Project (25 feet from the road right-of-way). Electrical cables that connect the two main units of panels will be directionally bored under or spanned over county roads. Similarly, areas categorized as forest & woodland land will not be impacted by the solar facilities (Table 4.2-7). Elk Creek has designed the solar facility to avoid tree clearing.

Table 4.2-7 Land Use Impacts

Land Use Type	Acres in Preliminary Development Area	Percent of Total Acreage
Agricultural	670.1	98.4%
Developed	10.6	1.5%
Forest & Woodland	0.0	0.0%
Shrubland	0.6	<0.1%
Total	**681.2**	**100.0%**

Source: USGS, 2011.

Agricultural land will be converted from an agricultural use to solar energy use for the life of the Project. The conversion of agricultural land to solar facility within the Preliminary Development Area will have a minimal impact on the rural character of the surrounding area or Rock County. As discussed further in Section 4.3, Land-based Economies, of the 309,120 acres in Rock County, approximately 90 percent (approximately 280,537 acres) are classified as agricultural land. Impacts to 669.0 acres of agricultural land within the solar facility would reduce the amount of agricultural land in the county by less than one percent.

Due to the amount of agricultural land impacted by the Project, Elk Creek has coordinated with MDA on an AIMP (Appendix C). This AIMP has been designed to incorporate best management practices (BMPs) into siting procedures; pre-construction, construction, and post construction

methods; operational procedures; and decommissioning and restoration procedures to avoid and minimize impacts to soil and site productivity such that pre-construction agricultural productivity (anticipated use, appropriate management) is rapidly returned to the site following decommissioning. Elk Creek met with MDA on April 9, 2019 to discuss the AIMP's contents and site-specific characteristics. MDA reviewed and approved the AIMP for the Elk Creek Solar Project as attached as Appendix C (see Appendix A for agency correspondence).

As noted above, development of solar energy systems within the Rock County general agricultural district is a conditionally permitted use (Rock County, 2018). As the Elk Creek Solar Project is subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, the Site Permit will serve as the land use permit. Elk Creek will continue to coordinate with Rock County on potential permits for the Project.

4.2.9 Public Services and Infrastructure

This section describes the public services and infrastructure within the Land Control Area and impacts this Project may have on public services.

Public Services

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 Rock County are supplied water by wells (see Section 4.5.2) or by Rock County Rural Water. Sewage is serviced by residential septic tanks and/or drain fields. Telephone services are provided by Quest Corporation; there are a number of broadband providers in Rock County (Minnesota Department of Employment and Economic Development, 2018).

Public Utilities

The Project is located adjacent to the existing ITC Magnolia substation. As mentioned in Section 4.2.4, there are two transmission lines at least partially within the Land Control Area. Approximate locations of these transmission lines are displayed on Figure 11 – Existing Infrastructure and AADT. There are no pipelines in the Land Control Area (National Pipeline Mapping System, 2019).

Transportation

The major roadway in the area is Interstate 90, approximately 2.5 miles south of the Land Control Area. With the exception of CSAH 3 which forms the eastern boundary of the Project, roads that surround the Land Control Area are local county or township roads. The Land Control Area is bordered on the north by 151st Street, bordered on the south by 131st Street and bisected by 141st Street. Similarly, the Land Control Area is bordered by 180th Avenue on the west, CSAH 3 on the east, and bisected by 190th Avenue. Annual Average Daily Traffic (AADT) counts based on Minnesota Department of Transportation's (MNDOT's) 2016 Publication of traffic volumes for Rock County are provided in Table 4.2-8 and displayed on Figure 11 – Existing Infrastructure and AADT (MNDOT, 2018).

Table 4.2-8 Annual Average Daily Traffic in the Project Vicinity		
Roadway	**Year**	**AADT Traffic Volume Total**
CSAH 3 (adjacent to Land Control Area)	2018	290
Interstate 90 (approximately 2.5 miles south of Land Control Area)	2018	10,100
CSAH 8 (one mile north of Land Control Area)	2018	210

Source: MNDOT, 2018

There will be four access points to the Project: the northern unit of the Project will be accessed from 190th Avenue and the central and southern units of the Project will be accessed from CSAH 3. There will also be an access to the Project substation from 190th Avenue.

MNDOT provided early review comments on the Elk Creek Solar Project on March 5, 2019. These early comments revolved around access, vegetation management, and permitting (see Appendix A).

There are no railroads within one mile of the Land Control Area. There is a Chicago and Northwestern railway approximately two miles south of the Land Control Area that parallels Interstate 90 and connects several towns.

The nearest Federal Aviation Administration (FAA)-registered airport to the Elk Creek Solar Project is the Quentin Aanenson Field Airport located approximately 7.5 miles southwest of the Project. This airport operates one asphalt runway.

4.2.9.1 Impacts and Mitigation

Public Services

Elk Creek will coordinate with Gopher State One Call before and during construction to fully understand infrastructure locations and safety concerns and to avoid possible structural conflicts. Elk Creek Solar 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 Elk Creek 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.

Public Utilities

As described in Section 3.1.7, the Project will interconnect into the existing Magnolia Substation via a gen-tie 161 kV transmission line of less than 1,500 feet. The Project will not impact existing transmission lines. During interconnection, customers may experience short outages when the Magnolia 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 (ITC Midwest).

Transportation

Access to the Project will be via existing county and township roads. With the limited possible exception of minor field access or driveway changes depending on final design, no changes to existing roadways will occur. The roads used for access to the Elk Creek Solar Project are shown on Figure 11 (Existing Infrastructure and AADT). 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 50-100 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, Elk Creek will obtain the appropriate approvals prior to construction. For purposes of comparison, the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day (AADT). Since the area roadways have AADTs that are well below capacity, 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.

Elk Creek used the FAA Notice Criteria Tool to determine the need for filing 7460-1 Notice of Proposed Construction forms (Appendix A). The results indicated the Project does not exceed the Notice Criteria, however Elk Creek filed 7460-1 forms for the perimeter of the Land Control Area in June of 2019. On July 9, 2019, the FAA 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. No mitigation measures are anticipated or proposed for air traffic.

4.3 Land-Based Economies

4.3.1 Agriculture

According to the U.S. Department of Agriculture's (USDA's) 2012 Census of Agriculture, of the 309,120 acres that comprise Rock County, approximately 280,537 acres (90 percent) are farmland. A total of 689 individual farms are located in Rock County, with the average farm size at 407 acres. The top crops (in acres) include corn, soybeans, foraging crops (hay and haylage, grass silage, and greenchop), oats, barley, and other vegetables harvested for sale. Hogs and pigs top

the list of livestock inventory in Rock County, followed by cattle, sheep and lambs, and poultry (layers) (USDA, 2012).

The market value of agricultural production in Rock County in 2012 was approximately $398 million. Livestock, poultry, and their products accounted for approximately 55.3 percent of the total value of agricultural production, while crop sales accounted for the remaining 44.7 percent (USDA, 2012).

Prime farmland is discussed in Section 4.5.3.

4.3.1.1 Impacts and Mitigation

The Project will impact approximately 670.1 acres of agricultural land within the Preliminary Development Area and will not result in a significant impact to land-based economies in the Project vicinity, as this acreage constitutes less than one half of one percent of the agricultural land in Rock County (280,537 acres). Agricultural production would continue in the surrounding areas during construction and operation of the Project. The revenue lost from removing land from agricultural production will be offset by the leases and purchase options with the landowners. Areas disturbed during construction will also be repaired and restored to pre-construction contours and characteristics to the extent practicable. This restoration will allow the Project's land surfaces to drain properly, blend with the natural terrain, re-vegetate, and avoid erosion. Agricultural production would be allowed to continue in the area within the Land Control Area but outside the fence of the Preliminary Development Area during construction and operation of the Project. Similarly, if hazing or grazing vegetation management strategies are used, some agricultural activities would continue within the Preliminary Development Area.

Based on discussions with Project landowners, Elk Creek Solar is aware of drain tile in the Land Control Area. Elk Creek has obtained drain tile mapping from landowners for all but 80 acres of the Land Control Area and will continue to coordinate for mapping on the final 80-acre parcel. In the event the remaining drain tile mapping cannot be identified, Elk Creek will utilize other sources, including infrared aerial photographs, LiDAR data, and, if necessary, a site-specific tile locate survey. These features will be incorporated into the design of the solar facility. In the event that damage occurs to drain tile or private ditches as a result of construction activities or operation of the Project, Elk Creek Solar will repair any damages. More detail on drain tile identification, design considerations, construction measures, and operational measures is included in the AIMP.

No areas used for animal husbandry are located within the Land Control Area; therefore, no impacts to livestock are anticipated.

4.3.2 Forestry

There are no forestry operations in the Land Control Area; therefore, no forestry resources will be affected by the Project. One wooded area is located within the Land Control Area; the wooded area is a windbreak around the former farmstead in the southeastern portion of the Land Control Area (the NE ¼ of Section 35) that is not currently anticipated to be impacted by the Project.

4.3.2.1 Impacts and Mitigation

As none of the trees in the Land Control Area are considered forestry resources, and all trees will be allowed to remain, no mitigative measures are proposed.

4.3.3 Tourism

Primary tourism activities in the vicinity of Project facilities are associated with the recreational activities discussed in Section 4.2.7, and local community festivals and other events.

Examples of local community festivals include summertime events like Buffalo Days and the Rock County Fair hosted by the City of Luverne (luverneevents.com, 2019).

4.3.3.1 Impacts and Mitigation

Elk Creek Solar will construct the Project facilities within the limits of the Land Control Area and no road closures are anticipated to be necessary during active construction. The annual events hosted by the City of Luverne do not occur within the Land Control Area; most of these events are held within city limits or in areas outside of the Land Control Area. No impacts to public access to these events is anticipated during construction or operation of the Project.

No impacts to tourism are anticipated and therefore no mitigative measures are proposed.

4.3.4 Mining

Based on MNDOTs Aggregate Source Information System and County Pit Map for Rock County, there are no gravel pits in the Land Control Area (MNDOT, 2018; MNDOT, 2003). On the Rock County Pit Map, two gravel pits are shown between 2.7- and 3.6-miles southwest of the Land Control Area, near the City of Luverne.

4.3.4.1 Impacts and Mitigation

No impacts to mining operations are anticipated and therefore no mitigative measures are proposed.

4.4 Archaeological and Historical Resources

Area M Consulting (Area M) conducted a Phase I cultural resources investigation of the Land Control Area. A copy of the Phase I inventory report is provided in Appendix D.

The Phase I inventory included a review of documentation on file at the Minnesota State Historic Preservation Office (SHPO), as well as various historical maps (i.e., Century Public Land Survey maps, Andreas maps, General Land Office maps, Trygg maps, and historic aerial photographs), to identify archaeological or historic sites, historic architectural resources, and previous cultural resource inventories within one-half mile of the Land Control Area. Area M also reviewed the online database of archaeological data managed by the Office of the State Archaeologist and conducted extensive review of LiDAR imagery as part of the Phase I inventory. No previously

recorded archaeological or historic sites, historic architectural resources, or previous cultural resources inventories were noted within one-half mile of the Project.

Area M conducted a Phase I field inventory of the entire 970-acre Land Control Area in April and May 2019. The Phase I field inventory included systematic pedestrian survey along transects spaced 3 meters apart and subsurface shovel testing along transects placed 15 meters apart. Ground visibility at the time of survey ranged from 40 to 75 percent; no cultural resources were identified as a result of survey.

Area M submitted the Phase I inventory report for the Project to the Minnesota SHPO in June 2019. In a letter dated July 3, 2019, the Minnesota SHPO concurred with Area M's recommendations that the Project would not affect historic properties listed in or eligible for listing in the National Register of Historic Places (NRHP). A copy of the Minnesota SHPO's letter is provided in Appendix A.

4.4.1 Impacts and Mitigation

No archaeological or historic sites, or historic architectural resources were identified during Phase I inventory of the Land Control Area; 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.

Before construction of the Project begins, Elk Creek 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.

4.5 Natural Environment

4.5.1 Air

Section 109(b) of the Clean Air Act (CAA) requires that the U.S. Environmental Protection Agency (EPA) establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and welfare (40 Code of Federal Regulations Part 50). The CAA identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children and the elderly; and secondary standards which are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife and structures. The EPA has promulgated NAAQS for six criteria pollutants: ozone (O_3), particulate matter (PM_{10}/$PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and lead (Pb). Minnesota has been in compliance with the primary and secondary NAAQS for all criteria pollutants since 2002 (MPCA, 2019a).

In Minnesota, air quality is tracked using air quality monitoring stations across the State. The MPCA uses data from these monitors to calculate the Air Quality Index (AQI), on an hourly basis, for O_3, $PM_{2.5}$, SO_2, NO_2, and CO. The pollutant with the highest AQI value for a particular hour sets the overall AQI for that hour. The AQI is used to categorize the air quality of a region as one of five levels of quality: good, moderate, unhealthy for sensitive groups (USG), unhealthy, or very unhealthy (MPCA, 2019b).

The Project is located nearest to the air quality monitor in Marshall, Minnesota. This station monitors for O_3 and $PM_{2.5}$. The AQI for Marshall for the past five years is provided in Table 4.5-1 (MPCA, 2019c).

Table 4.5-1
Days in Each Air Quality Index Category (Marshall, Minnesota)

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2017	329	31	0	0	0
2016	336	19	1	0	0
2015	338	26	1	0	0
2014	320	43	1	0	0
2013	291	72	2	0	0

Source: MPCA, 2019c.

Air quality has been considered good for the majority of the past five reported years in Marshall. Since 2013, the largest number of days classified as moderate or USG occurred in 2013. No days have been classified as unhealthy or very unhealthy.

4.5.1.1 Impacts and Mitigation

When necessary, dust from construction traffic will be controlled using standard construction practices such as watering of exposed surfaces, covering of disturbed areas, and reduced speed limits. Emissions from construction vehicles will be minimized by keeping construction equipment in good working order. 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.

Soils at the Project are not susceptible to wind erosion, which may create dust. Therefore, construction-specific mitigation measures and BMPs related to dust control have not been identified. If wind erosion becomes an issue during construction, standard industry practices may be implemented, including mulching exposed soils, wetting exposed soils, maintaining vegetative cover (both cover crops and permanent vegetation), and reduced speed limits. Emissions from construction vehicles will be minimized by keeping construction equipment in good working order. Overall, dust emissions currently experienced annually in the area through farming activities will be reduced for the life of the Project.

4.5.2 Geology and Groundwater Resources

The land surface in southwestern Minnesota was heavily influenced by the most recent glaciation. Ice sheets crossed the region several times during the Wisconsin glaciation, depositing a mantle of drift 100 to 600 feet thick in most places. The major landform in the Inner Coteau ecological subsection is highly dissected moraines of pre-Wisconsin drift, capped by thick (6 to 15 feet) wind-blown silt (loess) deposits. Topography is level to gently rolling till plains, moraines, lake plains, and outwash plains.

Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The aquifers within these provinces occur in two general geologic settings: bedrock, and unconsolidated sediments deposited by glaciers, streams, and lakes. The Project is within the Western Province, which is characterized by clayey glacial drift overlying Precambrian and Cretaceous bedrock. In this province, groundwater is typically derived from limited extent surficial and buried sand aquifers. Fractured bedrock is usually buried deeply beneath glacial sediments and is only locally used as an aquifer (MNDNR, 2001).

Elk Creek reviewed the Land Control Area for EPA designated sole source aquifers (SSA), wells listed on the Minnesota County Well Index (CWI), and Minnesota Department of Health (MDH) Wellhead Protection Areas (WHPAs).

The EPA defines a SSA or principal source aquifer area as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2016). There are currently no EPA-designated SSAs in the Project vicinity (EPA, 2017).

The CWI is the most complete record of well construction and location in Minnesota and is kept up-to-date and maintained by the Minnesota Geological Survey, in cooperation with the MDH. A search of the CWI (MDH, 2019b) identified the one domestic well associated with a former farmstead within the Land Control Area (Figure 11 – Existing Infrastructure and AADT). Review of historic photography indicates this farmstead was mostly demolished sometime between 1991 and 2003; two of the original seven buildings remain on-site and are likely used for agricultural storage. The residential structure where the well is likely located is no longer present. Based on CWI data, it's unknown if this well has been appropriately abandoned.

Under the Safe Drinking Water Act (SDWA), each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. The SDWA was updated in 1986 with an amendment requiring the development of a broader-based Source Water Assessment Program, which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach. A WHPA encompasses the area around a drinking water well where contaminants could enter and pollute the well.

Public and non-public community water supply source-water protection in Minnesota is administered by the MDH through the Wellhead Protection program. WHPAs for public and community water-supply wells are delineated based on a zone of capture for 10-year groundwater time-of-travel to the well and are available through a database and mapping layer maintained by MDH (2019c). A search for WHPAs in the MDH database indicated there are none in the Land Control Area; the nearest WHPA is located in the town of Luverne, approximately 4.6 miles southwest of the Land Control Area.

4.5.2.1 Impacts and Mitigation

Impacts of the proposed Project to available geologic resources are likely to be limited. Due to the thickness of surficial materials (approximately 300 feet [Minnesota Geological Survey, 2018]), excavation or blasting of bedrock is extremely unlikely.

Impacts to geologic resources are not anticipated and mitigation is not expected to be necessary. Project facilities are not likely to affect the use of existing water wells because there are no wells within the Preliminary Development Area. Any dewatering required during construction will be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential impacts. If dewatering is necessary, Elk Creek will obtain a Water Appropriation Permit from MNDNR.

Impacts to groundwater resources, including aquifers, are not anticipated as water supply needs will be quite limited. It is probable that operations and maintenance water requirements will be satisfied with a single domestic-sized water well. Based on the small amount of increased impervious surface area that will be created by Project components (access roads, inverter skids, and Project substation/O&M building – 26.1 acres [see Table 3.3-1 in Section 3.3]), the Project will likely have minimal impacts on regional groundwater recharge. The foundations of the tracking rack system will likely be a driven steel pier and will likely not require concrete, although some concrete foundations may be required. Geotechnical soil testing will determine final installation process. Similarly, the exterior agricultural fence may require concrete foundations in some locations. If concrete is needed, it will be locally sourced; an on-site concrete batch plant will not be required for the Project.

In addition, Project facilities (i.e., the Preliminary Development Area) are located at least 220 feet from the nearest occupied residence, thereby minimizing the risk of impacts on private wells in the area. Although the existing well within the Land Control Area would not be affected by the Preliminary Development Area, Elk Creek will assess whether the well is open and cap it, if necessary, in accordance with Minnesota Department of Health requirements. Construction of the Project facilities is not likely to require subsurface blasting; therefore, disturbances to groundwater flow from newly fractured bedrock are not anticipated.

A National Pollutant Discharge Elimination System permit application to discharge stormwater from construction facilities will be acquired by Elk Creek from the MPCA. BMPs will be used during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion, whether the erosion is caused by water or wind. Practices may include containment of excavated material, protection of exposed soil, stabilization of restored material, and treating stockpiles to control fugitive dust. A SWPPP will be developed for the Project prior to construction that will include BMPs such as silt fencing (or other erosion control devices), revegetation plans, and management of exposed soils to prevent erosion. Because the Project will disturb more than 50 acres, Elk Creek will submit the SWPPP to MPCA for review and approval prior to construction and obtaining coverage under the General Construction Stormwater Permit.

4.5.3 Soils and Prime Farmland

Soil characteristics within the study area were assessed using the Soil Survey Geographic database (SSURGO) (Soil Survey Staff, 2019). 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. Soil maps are linked in the SSURGO database to information about the component soils and their properties (USDA, NRCS, 2019). Table 4.5-2 lists the soil types located within the Elk Creek Land Control Area.

Approximately 25 percent of the Elk Creek Land Control Area is underlain by hydric soils or soils containing hydric inclusions, indicating few, if any, wetlands as one of many wetland characteristics is hydric soil (see Section 4.5.5). All of the soils in the Elk Creek Land Control Area have low to moderate susceptibility to erosion by water (i.e., K-factors from 0.1 to 0.4). All of soils in the Elk Creek Land Control Area are in Wind Erodibility Group 3, 4, 4L or 6. Wind Erodibility Group values of 3, 4 and 4L correspond to Wind Erodibility Indices of 86 tons/acre/year, and WEG values of 6 correspond to 48 tons/acre/year (USDA NRCS, 2019).

Soils prone to compaction and rutting are subject to dramatic and adverse changes in soil porosity and structure as a result of mechanical deformation caused loading by equipment during construction. Compaction and rutting are related to moisture content and texture and are worse when medium and fine textured soils are subject to heavy equipment traffic when wet. Soils at the Elk Creek Solar Project are prone to compaction and rutting (Appendix C – AIMP).

Table 4.5-2 Summary of Soils within the Elk Creek Land Control Area

Map Unit Symbol	Soil Name	Acres	Percent Of Land Control Area	Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group
P48A	Allendorf silty clay loam, 0 to 2 percent slopes	0.2	0.02%	All areas are prime farmland	No	.24	6
P12B	Everly silty clay loam, 2 to 6 percent slopes	26.4	2.70%	All areas are prime farmland	No	.28	6
P14B	Flandreau silt loam, 2 to 6 percent slopes	78.0	7.99%	All areas are prime farmland	No	.32	6
P15B	Galva silty clay loam, 2 to 5 percent slopes	17.3	1.77%	All areas are prime farmland	No	.24	6
P55A	Kato silty clay loam, 0 to 2 percent slopes	9.6	0.99%	Prime farmland if drained	Yes	.32	6
P21A	Marcus silty clay loam, 0 to 2 percent slopes	49.2	5.04%	Prime farmland if drained	Yes	.28	4

Table 4.5-2 Summary of Soils within the Elk Creek Land Control Area							
Map Unit Symbol	**Soil Name**	**Acres**	**Percent Of Land Control Area**	**Farmland Designation**	**Hydric Soil**	**K-Factor**	**Wind Erodibility Group**
P27A	Primghar silty clay loam, 1 to 3 percent slopes	221.6	22.71%	All areas are prime farmland	No	.32	6
P28A	Ransom silty clay loam, 1 to 3 percent slopes	29.8	3.06%	All areas are prime farmland	No	.32	6
P29A	Rushmore silty clay loam, 0 to 2 percent slopes	54.7	5.61%	Prime farmland if drained	Yes	.32	6
P30B	Sac silty clay loam, loam substratum, 2 to 5 percent slopes	333.6	34.18%	All areas are prime farmland	No	.32	6
P31A	Spicer silty clay loam, 0 to 2 percent slopes	6.0	0.62%	Prime farmland if drained	Yes	.32	4L
P38B	Thurman sandy loam, 2 to 6 percent slopes	9.2	0.95%	Farmland of statewide importance	No	.20	3
P42A	Whitewood silty clay loam, 0 to 2 percent slopes	120.0	12.29%	Prime farmland if drained	Yes	.32	6
P43A	Wilmonton silty clay loam, 1 to 3 percent slopes	20.3	2.08%	All areas are prime farmland	No	.28	6
		975.9	**100%**				

Source: Soil Survey Staff, 2019.

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating) (USDA NRCS, 2019).

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed

according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate State agencies, typically in association with local soil conservation districts or other local agencies.

Table 4.5-2 lists the soils considered prime farmland and soils of statewide or local importance within the Elk Creek Land Control Area. Figure 12 (Farmland Classifications) depicts the distribution of prime farmland, prime farmland if drained, and not prime farmland in the Land Control Area.

4.5.3.1 Impacts and Mitigation

Soils

Impacts and mitigation for soils are described at a high level below. A more detailed discussion is provided in the AIMP (Appendix C).

Approximately 48% of soils that will be impacted by the Project are well drained, moderately well drained or somewhat excessively drained and suited for the existing agricultural production. The Project is located on level to nearly-level topography, which is consistent with the current agricultural production.

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 fields, the Project will minimize grading to the extent practicable (preliminary estimates are 55.7 acres). The northern half of the northern unit of the Land Control Area is not currently proposed to be a part of the Preliminary Development Area because this area is sloped to the north and utilizing the land would require extensive grading to achieve proper alignment of the solar panels in relation to the sun. 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 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. Conversely, should the above-ground configuration be used, soil impacts due to the below-ground installation of the electrical cables will be limited to the areas between the rows of panels and the inverter / transformer skid and then to the wooden poles and to the direct imbedding of approximately 185 18-inch diameter wooden poles. From a soils perspective, the above-ground collection configuration would have least amount of soil impacts because only a small portion of the DC and AC collection would be trenched into the ground (see Image 8 in Section 3.1.2.2). The hybrid collection system will have the more soil impacts than the above-ground system, but less than the below-ground system. Details about construction and operation activities for the Project are provided in Sections 3.4 and 3.5, respectively.

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, Elk Creek 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 limitations in the Preliminary Development Area. Elk Creek will design construction access and manage construction passes to minimize the number of trips occurring on a given soil 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 using native plants on solar sites (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 670 acres of agricultural land out of production will give the soils an opportunity to rest and regenerate. Agricultural land within the fenced area of the solar facility

will be converted to open, herbaceous (i.e., grassland) cover with the exception of the substation and O&M building, inverters, and access roads which will be converted to developed land and impervious surfaces (23.8 acres). Seed mixes are discussed in more detail in Section 4.5.6.

Prime Farmland

As shown in Table 4.5.3, 100% of the soils impacted by the Project are classified as prime farmland soils, or prime farmland if drained; however, it is important to note that the prime farmland designation is independent of current land use (USDA NRCS, 2019).

Table 4.5-3 Farmland Classifications within the Preliminary Development Area

Farmland Classification	Area (acres)	Percent of Preliminary Development Area
Prime Farmland	554.9	81.4%
Prime Farmland if Drained	126.3	18.6%
Farmland of Statewide Importance	0.0	0%
Not Prime Farmland	0.0	0%
TOTAL	**681.2**	**100%**

Source: Soil Survey Staff, 2019.

Prime farmland within the Preliminary Development Area will be placed in a permanent cover of prairie grasses according to seeding and management specifications agreed to between Elk Creek and the MNDNR to the benefit of wildlife and the soil. As discussed in Section 2.3.2, removing the land from agricultural production may be beneficial for limiting nitrogen infiltration into groundwater supply, thereby improving groundwater quality. Upon decommissioning, the land would be returned to its pre-construction agricultural use. Elk Creek anticipates that the property will be restored to agricultural use on decommissioning of the Project.

Initial post-construction revegetation efforts and maintenance of vegetation during operations and maintenance will consider selecting suited plants, managing seeding times for late spring early summer when soil moisture is optimum for germination, use of mulch and other BMPs. Existing tile drainage systems will be maintained during Project operations. The only impact to prime farmland is that the land will not be farmed for approximately 35 years.

4.5.4 Surface Waters and Floodplains

The Elk Creek Solar Project is located in the Big Sioux Watershed Basin (MNDNR, 2019b). There are no lakes or rivers in the Land Control Area; as such, there are no MNDNR Public Waters Inventory (PWI) watercourses or waterbodies in the Land Control Area (see Figure 13 – Water Resources). The nearest PWI waterbodies are Champepadan Creek, located approximately 0.4 mile to the north of the Land Control Area; and Elk Creek, located approximately 0.15 mile south of the Land Control Area. Both Champepadan Creek and Elk Creek are listed by MPCA as impaired waters. Surface waters within the Land Control Area are limited to five intermittent waterbodies (four in northwest portion and one in southeast portion of the Land Control Area) and one wetland area. Wetlands are valuable for surface and subsurface water storage, nutrient cycling, retention of sedimentation, and plant and animal habitats, and are described further in Section 4.5.5.

Based on the Federal Emergency Management Agency (FEMA) 1977 FIRM panel for Rock County, the Land Control Area is not located in a designated flood hazard area.

4.5.4.1 Impacts and Mitigation

The Project has been designed to avoid impacts to the five intermittent waterbodies within the Land Control Area. These waterbodies were confirmed non-jurisdictional by the wetland delineation and agency concurrence (Section 4.5.5 and 5.1.3). Solar panels will not be sited in these drainage ways; however, one access road will cross an intermittent stream. This crossing will be designed as a low water crossing to maintain flow when water is present. Additional detail on low water crossings is presented in Appendix B – Site Plan. Further, as discussed in Section 4.5.2.1, a SWPPP will be developed for the Project prior to construction that will include BMPs such as silt fencing (or other erosion control devices), revegetation plans, and management of exposed soils to prevent sediment from entering into waterbodies. Additionally, as described in Section 3.1.5.4, Elk Creek has preliminarily designed 13 stormwater drainage basins within existing low-lying areas to help control runoff during rain events.

Because the Project is within one mile of an impaired water, Elk Creek will submit the SWPPP to MPCA for review and approval prior to construction and obtaining coverage under the General Construction Stormwater Permit. The Project will not impact any FEMA-mapped floodplains.

4.5.5 Wetlands

The potential for wetlands within the Land Control Area was identified by reviewing desktop resources (i.e., National Wetlands Inventory [NWI] data, aerial photography, hydric soils map unites, LiDAR, and digital elevation models) followed by a formal wetland delineation within the Land Control Area in May 2019 (see Appendix E). The wetland delineation identified one palustrine emergent wetland (PEM) partially within the southeast portion of the Land Control Area (0.2 acres). The delineation also confirmed the absence of two NWI-mapped wetlands in the northwest portion of the Land Control Area. The Rock County Technical Evaluation Panel (TEP) reviewed and concurred with the findings of the wetland delineation (see Figure 13 – Water Resources and Appendix E).

4.5.5.1 Impacts and Mitigation

A perimeter access road will impact approximately 780 square feet of a delineated wetland. Elk Creek will permit these impacts under U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) 51 – Land-Based Renewable Energy Generation Facilities and by the local government unit (LGU) for the Minnesota Wetland Conservation Act. Elk Creek will coordinate with both the USACE and LGU prior to construction for wetland impacts. If any additional temporary disturbance occurs to the wetland, those impacts would fall under the same permit and Elk Creek would restore these impacts with a wet seed mix (Appendix C). Impacts to this wetland are not expected to affect surface water drainage or off-site wetlands.

4.5.6 Vegetation

The Elk Creek Solar Project is located in the Inner Coteau Subsection of the Prairie Parkland Province (MNDNR, 2019a). The Inner Coteau Subsection consists of highly dissected moraines

of pre-Wisconsin drift, capped by thick wind-blown silt deposits. Pre-settlement vegetation in the Inner Coteau Subsection consisted of tallgrass prairie. Current vegetation consists largely of agriculture; there are few remnants of pre-settlement vegetation left. Table 4.2-6 in Section 4.2.8.1 provides the total acres of each land use type within the Preliminary Development Area. Based on the USGS GAP landcover data, the Project would affect predominately agricultural land (96.1 percent). Developed, forest, and shrubland within the Preliminary Development Area total 3.9 percent. Forested land within the Land Control Area consists of an isolated block of trees serving as a shelter belt or wind break around a farmstead in an agricultural field. In addition, based on the wetland delineation discussed in Section 4.5.5, there is one wetland located within the Land Control Area. A discussion of wetland impacts is provided in Section 4.5.5.1.

4.5.6.1 Impacts and Mitigation

As discussed in Section 4.2.8.3, agricultural land will be converted from an agricultural 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 (669.0 acres). Agricultural land within the Preliminary Development Area will be converted to open, herbaceous (i.e., within the racking area) cover with the exception of the substation and O&M building, inverter skids, and access roads which will be converted to developed land and impervious surfaces (23.8 acres). Additionally, Elk Creek has designed the Project to avoid any tree clearing.

Typically, a solar site has a shorter prairie mix within the panel footprint, taller prairie plantings in the open space between the fence and array, and a wet seed mix for any wetlands or areas anticipated to hold water. The mixes are designed to be native and are developed with prairie specialists in coordination with the MNDNR to design a mix that will achieve Elk Creek's goals for operating the solar facility, promote pollinator habitat, establish stable ground cover successfully, reduce erosion, reduce runoff, and improve infiltration. Elk Creek's VMP, including the two seed mixes, is included in Appendix C.

4.5.7 Wildlife

4.5.7.1 Avian Species

The Elk Creek Solar Project is located within the Mississippi Flyway, one of the primary north-south migration routes between migratory bird nesting and wintering habitat (Audubon, undated). The Land Control Area is also located within the Eastern Tallgrass Prairie Bird Conservation Region (BCR) (USFWS, 2008). The USFWS identified 39 species of birds within Eastern Tallgrass Prairie BCR as Birds of Conservation Concern (BCC); BCC are avian species that represent the agency's highest conservation priorities. The BCC in the Eastern Tallgrass Prairie BCR include the bald eagle (*Halieetus leucocephalus*), American bittern (*Botaurus lentiginosus*), black rail (*Botaurus lentiginosus*), upland sandpiper (*Bartramia longicauda*), red-headed woodpecker (*Melanerpes erythrocephalus*), black-billed cuckoo (*Coccyzus erythropthalmus*), blue-winged warbler (*Vermivora cyanoptera*), grasshopper sparrow (*Ammodramus savannarum*), and dickcissel (*Spiza americana*) (USFWS, 2008).

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, 2007a; USFWS, 2018a). The MBTA protects migratory birds and most resident birds that are native to the U.S. from impacts and take. BGEPA protects and conserves bald eagles and golden eagles (*Aquila chrysaetos*) from intentional take of an individual bird, chick, egg, or nest, including alternate and inactive nests (USFWS, 2007a). 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, 2007a).

Land uses in the Land Control Area are primarily agricultural (96.1 percent), with some small amounts of developed areas (3.4 percent), forested land (0.3 percent), and shrubland (0.2 percent). The forested land that is present is generally limited to windbreaks around residences. As a result, few migratory bird species that use trees or forested areas as habitat will be present, such as bald eagle, black-billed cuckoo, and red-headed woodpecker. The Land Control Area also has very little open water (five intermittent waterbodies, see Section 4.5.4) and wetlands (one PEM wetland, see Section 4.5.5). Thus, few wetland- or water-dependent birds such as waterbirds would use the Land Control Area for nesting. Species of migratory birds associated with grasslands would also be limited or absent. Overall, few if any BCC are likely to use the Land Control Area as habitat.

The USFWS is also concerned about avian species that are at risk from habitat fragmentation. 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). At present, the Land Control Area is highly fragmented given 99.5 percent is used for agriculture or is developed. If species of habitat fragmentation concern are present in the Land Control Area, they have adapted to the fragmentation and current land uses.

4.5.7.2 Other Wildlife Species

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 (*Odocoileus virginianus*), striped skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), badger (*Taxidea taxus*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*). Reptiles that may occur in the Land Control Area are plains gartersnake (*Thamnophis radix*), and common gartersnake (*Thamnophis sirtalis*) (MNDNR, 2019c). The open water in the Land Control Area is limited to five intermittent waterbodies (see Section 4.5.4); thus, no fish species are present. Some pollinator insects may be present in the Land Control Area including native bees, butterflies, and moths.

4.5.7.3 Impacts and Mitigation

Given that the Project is comprised primarily of agricultural lands, occurrence of wildlife within the Land Control Area is limited. As a result, impacts on wildlife are expected to be minor. Restoration of the Land Control Area may result in wildlife benefits because it will be revegetated with a pollinator friendly seed mix. Common species of wildlife adapted to agricultural land use may be present in the Project such as white-tailed deer, red fox, striped skunk, wild turkey (*Meleagris gallopavo*), ring-necked pheasant (*Phasianus colchicus*), sandhill crane (*Grus canadensis*), passerines, rodents, snakes, and insects. During construction, highly mobile species of wildlife including deer, birds, and snakes are expected to divert to areas surrounding the Project. Less mobile species and ground nests of birds, eggs, and chicks may be impacted; however, given

that the Project area is cropland, these impacts may have occurred regardless of the Project. Overall, construction of the Project is expected to have minimal impacts on individuals of common wildlife species, and no impact on populations of these species. During operations, any potential impacts on wildlife are also expected to be minimal and insignificant. These impacts may be related to vehicle traffic and parking or mowing. Because any potential impacts on wildlife are anticipated to be minimal and insignificant, no species-specific mitigation is proposed.

After construction and during operations, the Project may provide more wildlife habitat than the current land use provides. Elk Creek will restore with a seed mix that may provide habitat for wildlife, including grassland birds, rodents, reptiles, and insects. In sum, although 26.1 acres within the Project would have permanent facilities (i.e., access roads, Project substation and O&M building, and inverters) and would not serve as wildlife habitat during operations, 655.1 acres would be restored as herbaceous cover, including a seed mix with some native plants, thereby potentially benefitting and increasing the overall populations of wildlife species in the area, including birds, small mammals, reptiles, and pollinator insects.

4.5.8 Rare and Unique Natural Resources

Elk Creek reviewed the USFWS Information for Planning and Conservation (IPaC) website for the federal endangered and threatened species, candidate species, and designated critical habitat that may occur in Rock County, Minnesota (USFWS, 2019a). Elk Creek also reviewed the MNDNR's Natural Heritage Information System (NHIS) for documented occurrences of federally listed species, state listed species, and state species of concern within one mile of the Land Control Area (MNDNR, 2019d and Appendix A). Although these reviews do not represent a comprehensive survey, they provide information on the potential presence of protected species and habitat (refer to Table 4.5-4).

Table 4.5-4
Federal and State Listed Species Documented within One Mile of the Land Control Area

Common Name	Scientific Name	Habitat	Within One Mile of Land Control Area	Within Land Control Area	Status [a]	
					State [b]	Federal [c]
Mammals						
Northern long-eared bat (NLEB) [d]	*Myotis septentrionalis*	In winter, hibernates in caves and mines. In fall, swarms in forested areas surrounding hibernation sites. During late spring and summer, forages and roosts in upland forests (USFWS, 2018b)	No	No	SC	T
Fish						
Topeka Shiner	*Notropis topeka*	Pools and runs in small to mid-size prairie streams (USFWS, 2019b)	Yes	No	SC	E & CH
Plains Topminnow	*Fundulus sciadicus*	Backwaters and pools of creeks and rivers with aquatic plants and a rocky or sandy bottom (MNDNR, 2019e)	Yes	No	T	None
Plants						
Prairie Bush Clover	*Lespedeza leptostachya*	Dry to mesic tallgrass prairies with gravelly soils (USFWS, 2009)	No	No	T	T
Western Prairie Fringed Orchid	*Platanthera praeclara*	Primarily mesic to wet unplowed tallgrass prairies. Less often in old fields and roadside ditches (USFWS, 2019c)	No	No	E	T

[a] E = Endangered, T = Threatened, SC = Special Concern, CH = Critical Habitat
[b] MNDNR, 2013; MNDNR, 2019d
[c] USFWS, 2019a
[d] Elk Creek's review of the NHIS did not indicate any records of the NLEB, western prairie fringed orchid, or prairie bush-clover within a mile of the Land Control Area or within the Land Control Area; however, review of the USFWS' IPaC indicated that these three species have the potential to occur in Rock County.

4.5.8.1 Federal Listed Species

According to Elk Creek's review of the USFWS IPaC, four species that are listed as threatened or endangered under the federal Endangered Species Act (ESA) may occur in Rock County, Minnesota: northern long-eared bat (NLEB) (*Myotis septentrionalis*), Topeka shiner (Notropis topeka), prairie bush clover (*Lespedeza leptostachya*), and western prairie fringed orchid (*Platanthera praeclara*). In addition to these four federally listed species, there is designated critical habitat for the Topeka shiner in Rock County (USFWS, 2019a).

Northern Long-eared Bat

The NLEB is listed as threatened under the 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).

The Land Control Area is primarily agricultural lands with only a small area of forested habitat (0.3 percent); the landscape surrounding the Land Control Area is also dominated by agriculture. During their active season (April 1 through October 31), NLEB may roost in the trees within the Land Control Area.

Topeka Shiner

Topeka shiner (*Notropis topeka*) occur in small to mid-size prairie streams in the southwestern Minnesota. The species has been documented in the Rock River and its tributaries and tributaries to the Big Sioux. Streams inhabited by Topeka shiner are slow-moving, low-gradient, and winding with sand, rubble, or silt-covered gravel substrates. They often live in the pool areas of the streams (Simons et al., 2012; USFWS, 2007b; USFWS, 2019b).

The Land Control Area is primarily agricultural lands with no perennial streams. Thus, no Topeka shiner are expected within the Land Control Area. The MNDNR NHIS review confirmed records of Topeka shiner within one mile of the Land Control Area.

Topeka Shiner Critical Habitat

Critical habitat is specific geographical areas designated by the USFWS with biological and physical features that are essential to the recovery of the species. Critical habitat may be occupied or unoccupied at the time of designation. Critical habitat is protected against destruction or adverse modification under Section 7 of the ESA during actions that are funded, permitted, or implemented

by a federal agency. The Project will likely require a permit from the USACE for wetland impacts; as such, critical habitat protections apply to this Project. Elk Creek Solar will implement the critical habitat BMPs discussed in Section 4.5.8.4.

In Minnesota, Topeka shiner critical habitat is located throughout the Rock River and Big Sioux River watersheds. The nearest streams with designated critical habitat to the Land Control Area are Elk Creek, which is 0.15 mile southeast of the Land Control Area, and Champepadan Creek, which is 0.4 mile north of the Land Control Area (USFWS, 2002; USFWS, 2004). The physical and biological features that are essential to Topeka shiner recovery and that characterize the species' critical habitat include the following: "space for individual and population growth, and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing (or development) of offspring; and habitats protected from disturbance or that are representative of the historic geographical and ecological distribution of the species" (USFWS, 2002, p. 54264).

Prairie Bush Clover

The federally threatened prairie bush clover (*Lespedeza leptostachya*) is a tallgrass prairie endemic native to the upper Mississippi River Valley. Its current range is limited to discrete locations in Minnesota, Illinois, Iowa, and Wisconsin. The species flowers in mid-July to early August producing pale-pink flowers arranged loosely on an open spike. Prairie bush clover occurs on dry-mesic prairies with gravelly soils on north-, northeast- or northwest-facing slopes in southwestern Minnesota. Remaining occurrences of the species are generally restricted to remnant prairies; in Minnesota, most populations occur in prairies that were formerly or are currently pasture. The primary threat to the species is habitat loss and destruction (MNDNR, 2019f; USFWS, 2009).

The Land Control Area is dominated by agriculture (96.1 percent) with small amounts of developed lands (3.4 percent) and forested areas (0.3 percent). There is no prairie within the Land Control Area. Thus, prairie bush clover is not expected to occur within the Land Control Area.

Western Prairie Fringed Orchid

Western prairie fringed orchid occurs in mesic to wet tallgrass prairies and sedge meadows, although the species has also been documented in roadside ditches and old fields. The species is pollinated primarily by hawkmoths that are attracted to the orchid's nocturnally fragrant flowers. Adequate nutrition and water uptake are dependent on a symbiotic relationship between the orchid's root system and a fungus within the soil. The species' primary threat has been conversion of its prairie habitats to cropland (USFWS, 2015; USFWS, 2019c).

The majority of the Land Control Area is used for agriculture, specifically row crops; no prairie habitat or old fields are present. Some roadside ditches are present along the perimeter of portions of the Land Control Area. However, no western prairie fringed orchids were observed during wetland delineations at the Project.

4.5.8.2 State Listed Species

State listed species with documented occurrences within one mile of the Land Control Area are shown in Table 4.5-4. Based on Elk Creek's NHIS review, there are no records of state listed

species within the Land Control Area. Within one mile of the Land Control Area, there are three records of the Topeka shiner, a state species of concern, and one record of the plains topminnow (*Fundulus sciadicus*), a state threatened species. These records were confirmed by the MNDNR NHIS response (Appendix A).

A description of the natural history and potential presence of Topeka shiner in the Land Control Area is provided in Section 4.5.8.1 on Federally Listed Species.

Plains topminnows occur in backwaters and pools of creeks and rivers with aquatic plants and a rocky or sand bottom. The plains topminnow lives in small schools or independently; its prey includes ostracods, larval blackflies and midges, and small snails (MNDNR, 2019e). No rivers or streams are located in the Land Control Area, and thus, no plains topminnows will be present.

4.5.8.3 MNDNR High Value Areas

The MNDNR issued guidance for commercial solar sites entitled Commercial Solar Siting Guidance (May 2016) (Solar Guidance) that recommends identification of high value resources during Project development. High value resources include (1) rare species and native plant communities (NPCs); (2) native prairie; (3) species and habitats included in the Wildlife Action Network and Minnesota Wildlife Action Plan; (4) lakes, wetlands, streams, and rivers; (5) large block habitats; (6) public conservation and recreation lands; and (7) properties in government programs or with conservation easements (MNDNR, 2016a).

Rare Species and Native Plant Communities

Rare species including federal- and state-listed species are discussed in Sections 4.5.8.1 and 4.5.8.2. This includes records of federal and state-listed species tracked by the MNDNR in the NHIS database. Additionally, the MNDNR has classified NPCs within the state using plant species, soils, and other site-specific data from vegetation plots. The current NPC classification covers most of the wetland and terrestrial vegetation in the state and was completed in 2003. It is a six-level hierarchical classification that accounts for vegetation structure and geology, ecological processes, climate and paleohistory, local environmental conditions, canopy dominants, substrate, and environmental conditions (Aaseng et al., 2011). Based on a review of the MNDNR's data, there are no NPCs or mapped native prairie within the Land Control Area.

MNDNR's Minnesota Biological Survey (MBS) assesses Minnesota landscapes for NPCs, rare animals, rare plants, and animal communities through desktop review and follow-up field survey. Based on this assessment, MBS designates and assigns rankings to SOBS, based landscape context, NPC, and occurrence of rare species populations. The MBS groups and ranks SOBS for each Minnesota's system subsections for the purpose of designating and cataloguing the state's most notable examples of NPCs and rare species. There are four ranks for SOBS: outstanding, high, moderate, and below (MNDNR, 2009). Based on a review of the MNDNR's data, there are no SOBS within the Land Control Area.

Native Prairie

Native prairie is defined as a grassland that has not been plowed with plant species typical of prairies (MNDNR, 2016a). The MNDNR's railroad prairie rights-of-way are native prairie

remnants that occur along railroad rights-of-way. The railroad rights-of-way program was instituted in 1997 by the Minnesota legislature in the Prairie Parkland and Eastern Broadleaf Forest ECS Provinces. The MNDNR ranks railroad rights-of-way into three categories: very good, good, and fair. There is no MNDNR-mapped native prairie in the Land Control Area.

Wildlife Action Network and Minnesota Wildlife Action Plan

The Wildlife Action Network is comprised of areas with high concentrations or persistent or viable populations of Species of Greatest Conservation Need (SGCN), in addition to SOBS, Lakes of Biological Significance, and streams with exceptional indices of biological integrity. Minnesota's State Wildlife Action Plan (SWAP) (2015-2025) proactively addresses the state's conservation needs and catalyzes actions to prevent species from becoming listed under the state endangered species program or the ESA. The SWAP also entailed revisions to the state's list of SGCN. SGCN are native animals with rare, declining, or vulnerable populations and species for which the state has a stewardship responsibility (MNDNR, 2016b).

The Land Control Area does not intersect any habitats within the Wildlife Action Network including SOBS, lakes of biological significance, or streams with exceptional indices of biological integrity. Based on Elk Creek's review of the MNDNR's NHIS, no SGCN have been documented within the Land Control Area.

Lakes, Wetlands, Streams, and Rivers

Lakes, wetlands, streams, and rivers are discussed in sections 4.5.4 and 4.5.5. The Land Control Area also has five intermittent waterbodies and one PEM wetland.

Large Block Habitats

Large block habitats are grassland habitats of greater than 40 acres (MNDNR, 2016b). The Land Control Area is highly fragmented; 99.5 percent is used for agriculture or is developed. The Land Control Area contains no large block habitats.

Public Conservation and Recreation Lands

Public conservation and recreation lands include state lands administered by the MNDNR or by counties; scientific and natural area units; publicly accessible state WMAs; state forest statutory boundaries and management units; state parks, recreation areas, and waysides; state trails of Minnesota; public water access sites in Minnesota; and state aquatic management area acquisitions (MNDNR, 2016a). There are no public conservation and recreation lands in the Land Control Area; public conservation and recreation lands in the Project vicinity are discussed in Section 4.2.7.

Properties in Government Programs or with Conservation Easements

Based on the MNDNR's Solar Guidance, properties in government programs or with conservation easements include MNDNR Native Prairie Bank, Reinvest in Minnesota, Forest Legacy easements, and USFWS conservation easements (MNDNR, 2016a). There are no properties in government programs or with conservation easements in the Land Control Area.

4.5.8.4 Impacts and Mitigation

Federal Listed Species

The USFWS published a final 4(d) rule for the NLEB on January 14, 2016. In the final 4(d) rule, the agency limited prohibitions for the species to those that would protect the bat in WNS-affected geographic areas during the most vulnerable stages in the species' life history—specifically, during hibernation, spring staging, fall swarming, and pup rearing (USFWS, 2016a). The Land Control Area is located within the USFWS-designated WNS Zone (USFWS, 2018c). Per the USFWS' Final 4(d) rule for NLEB, within the WNS Zone, incidental take due to tree removal is prohibited as follows:

- If it occurs within 0.25 mile of a documented hibernaculum, or
- If it involves a documented maternity roost tree or other trees within 150 feet of the documented maternity roost tree during June or July.

In addition, all take within known hibernacula is prohibited (USFWS, 2016a).

Records of documented hibernacula and roost trees are maintained in the MNDNR's NHIS. Based on a review of NLEB NHIS records, Elk Creek determined that there are no documented NLEB maternity roost trees within 150 feet of the Land Control Area or documented hibernacula within 0.25 mile of the Land Control Area. Although there are no records of NLEB, the species may still be present in the Land Control Area. Under Section 7(a)2 of the ESA, federal action agencies may rely upon the Programmatic Biological Opinion for the Final 4(d) Rule developed by USFWS on January 5, 2016 to meet its Section 7 consultation responsibilities for the NLEB (USFWS, 2016b). Under the Programmatic Biological Opinion, project proponents may use a streamlined approach involving an online NLEB 4(d) rule determination key and consultation form. After submittal of the consultation form, the USFWS has 30 days to respond. If no response is received, the federal action agency can assume that the project may affect but is not likely to cause prohibited take of individual NLEB, and consultation requirements for the species under Section 7(a)2 are complete. Elk Creek will use the streamlined approach and Programmatic Biological Opinion for the Final 4(d) rule and will submit on online NLEB consultation form for the Elk Creek Solar Project prior to construction.

Overall, Elk Creek does not anticipate that the Project will impact NLEB during construction or operations. Construction of the Project will not require tree clearing; thus, Elk Creek does not anticipate that any individuals would be injured or killed due to clearing of occupied trees during the species' active window (April 1 – October 31). NLEB may be temporarily disturbed during construction activities due to human presence or noise if they are roosting in the trees within the Land Control Area, but Elk Creek anticipates that any impacts due to noise and human presence would be insignificant.

The prairie bush clover is a tallgrass prairie endemic. No impacts on prairie bush clover are expected during Project construction and operations because no tallgrass prairie habitat is present within the Land Control Area.

Primary habitat for the western prairie fringed orchid is mesic to wet prairies; however, individuals have also been documented in roadside ditches and old fields. The Land Control Area is dominated by agriculture (96.1 percent), with small amounts of forested area (3.4 percent) and developed lands (0.3 percent); no prairie habitat or old fields are present. Some roadside ditches may be present along the perimeter of portions of the Land Control Area. However, construction would not occur within the roadside ditches aside from new access roads, and solar facilities would not be placed within the roadside ditches per the Rock County Renewable Energy Ordinance (facilities will be setback at least 25 feet from the road right-of-way; see Table 3.2-1). Elk Creek would minimize any potential erosion from the construction area into roadside ditches by placing silt fences around the boundaries of the Preliminary Development Area adjacent to roadside ditches. Herbicide use will be limited to spot spraying of invasive species within the Preliminary Development Area. In addition, Elk Creek will not use insecticides to prevent impacts on the species' pollinators. Overall, because of the limited habitat available in the Land Control Area and the conservation measures that Elk Creek will be implementing, Elk Creek does not anticipate impacts on western prairie fringed orchid during Project construction and operations.

Topeka shiner occur in small to mid-size prairie streams. Habitat for Topeka shiner is not present in the Land Control Area; the nearest stream with Topeka shiner is Elk Creek, which is about 0.15 mile southeast of the Land Control Area. Topeka shiner critical habitat is designated in Elk Creek and Champepadan Creek that are approximately 0.15 mile southeast and 0.45 mile north of the Land Control Area, respectively. No direct impacts from the Project on Topeka shiner critical habitat are anticipated because the critical habitat does not intersect the Land Control Area. To avoid indirect impacts, Elk Creek will follow the USFWS' "Recommendations for Projects Affecting Waters Inhabited by Topeka Shiners (*Notropis topeka*) in Minnesota" (USFWS, 2016c). Specific recommendations that may apply to the Elk Creek Solar Project during construction include the following:

- Implement all applicable requirements and BMPs for stormwater and erosion control;
- Mulch areas of disturbed soils and re-seed promptly with non-invasive, preferably native species;
- Implement appropriate erosion and sediment prevention measures to the maximum extent practicable;
- Inspect erosion devices frequently to ensure that they are effective and in good repair, especially after precipitation;
- If rolled erosion control products are to be utilized, they should be limited to bio-netting, natural-netting, or woven-type products;
- Avoid welded plastic mesh netting to reduce potential for fish and wildlife entanglement; and
- Ensure that contractors and subcontractors understand all permit provisions that are necessary to avoid or minimize adverse effects to Topeka shiners (USFWS, 2016c).

Elk Creek expects no impacts on Topeka shiner or Topeka shiner critical habitat during Project construction and operations given that the Land Control Area is 0.15 mile and 0.4 mile from the nearest habitat and critical habitat and based on Elk Creek's commitment to implement the USFWS' recommendations for avoiding impacts on Topeka shiner. Elk Creek will continue to

coordinate with the USFWS Minnesota-Wisconsin Field Office regarding the Elk Creek Solar Project.

State Listed Species

Based on Elk Creek's NHIS review, no records of state listed species were documented within the Land Control Area. Records of two state listed species were documented within one mile of the Land Control Area—Topeka shiner, a state species of concern, and plains topminnow, a state threatened species. Impacts on Topeka shiner are discussed in the section on Federally Listed Species. The habitat for the plains topminnow is backwaters and pools of streams and creeks. No perennial streams and creeks are present in the Land Control Area. In addition, Elk Creek will be implementing a suite of conservation measures outlined above for the Topeka shiner. Therefore, Elk Creek expects that there will be no impacts on these species due to the construction and operation of the Elk Creek Solar Project.

Elk Creek sent a Project introduction letter to MNDNR staff in February 2019 and followed up in May 2019 with an updated Project description. On March 15, 2019, the MNDNR responded to Elk Creek on March 15, 2019 with the following recommendations:

- Review the MNDNR's Commercial Solar Siting Guidance (MNDNR, 2016a);
- Consider potential issues with surface drainage, water retention, and wet soils during construction and restoration including timing construction in July, August, and September and establishing a cover crop several months before construction; and
- Use a diverse mix of native species to stabilize the soil and provide long-term pollinator habitat per their guidance document for solar projects on establishing and maintaining prairies (MNDNR, 2018).

On May 17, 2019, MNDNR echoed the March 15, 2019 response and suggested Elk Creek submit an NHIS request to MNDNR for records of rare species.

Elk Creek reviewed the MNDNR Commercial Solar Guidance for the Elk Creek Solar Project (see Section 4.5.8.3). Additionally, Elk Creek will implement MNDNR guidance of wildlife-friendly fencing by installing agricultural woven wire fence that will extend approximately 6 feet above grade. At the request of MNDNR, barbed wire will not be used around the perimeter of the Project, and instead one foot of 3-4 strands of smooth wire will be used.

Elk Creek has developed an AIMP that, in part, outlines construction measures for wet soils. The accompanying VMP includes seed mixes for the Project that were reviewed and approved by MNDNR (Appendices A and C). The VMP also describes implementation of a cover crop to stabilize soils.

MNDNR High Value Areas

Federal and state listed species are described above. There are no additional MNDNR High Value Areas in the Land Control Area, including native plant communities; native prairie; SGCN species; large block habitats; lakes, streams, and rivers; public conservation and recreation lands; and

properties in government programs or with conservation easements. As such, impacts to MNDNR High Value Areas will be minimal and no mitigative measures are proposed.

4.6 Unavoidable Impacts

Elk Creek developed the Project to avoid impacts to environmental resources whenever possible. In some cases, impacts to environmental resources could not be entirely avoided, but could be minimized by implementation of mitigation measures. A detailed discussion of the environmental impacts of the proposed Project, as well as the mitigation measures that would be used to minimize impacts is presented in Sections 4.1 through 4.5 of the Site Permit Application. Environmental impacts that would be minimized by the use of mitigation measures, but not entirely avoided are provided below. Most of these unavoidable impacts would occur during construction of the Project and would resolve with the completion of construction.

Unavoidable impacts related to the Project that would last only as long as the construction period include:

- noise emitted from vehicles and equipment during construction that will be audible to neighboring landowners;
- increased traffic on roads that bisect the Land Control Area;
- minor air quality impacts due to fugitive dust;
- potential for soil erosion; and
- disturbance to and displacement of some species of wildlife.

Unavoidable impacts related to the Project that would last as long as the life of the Project would include:

- changes to existing aesthetics of landscape (from agrarian to solar facility), which will be visible from local roadways and parcels; and
- changes in land use and vegetation from agricultural land of predominately corn and beans to a solar facility with herbaceous vegetation underneath and around the Preliminary Development Area.

5.0 AGENCY AND PUBLIC OUTREACH

This section describes outreach efforts conducted by Elk Creek Solar and discusses pre-Application involvement by federal, state, and local agencies as well as the public information outreach campaign. Throughout the process, Elk Creek Solar provided opportunities for stakeholders and potentially affected landowners to participate in the siting process. This engagement provided Elk Creek Solar with valuable insight into landowners' and public agency preferences regarding development of Project facilities.

5.1 Agency Involvement in Pre-Application

As part of pre-Application efforts, Elk Creek 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 5.1-1). This included meetings with the MDA, MNDOT, and township and county officials.

On February 26, 2019 and May 13, 2019, Elk Creek Solar sent an informal Project introduction letter and map to federal and state agencies. On May 1, 2019, Elk Creek Solar sent an introduction letter and map to local agencies and stakeholders with jurisdiction in the Land Control Area and on July 30, 2019, Elk Creek sent an introduction letter to the Luverne School District. Elk Creek requested input with respect to the resources under their jurisdiction as well as the identification of permits and/or approvals that may be potentially required for the Project.

A representative letter and responses received as of August 2019 are included in Appendix A. A summary of responses and meetings with federal and state agencies is included below. Elk Creek Solar will continue to coordinate with township and county officials as the Project moves forward and will seek any necessary local permits. Table 5.1-1 identifies agencies that were contacted through meetings or a notification letter and the date that the consultation was conducted.

Table 5.1-1
Elk Creek Solar Agency Correspondence

Agency	Response Date (Type)
Federal	
U.S. Army Corps of Engineer, St. Paul District	May 30, 2019 (Agency response)
U.S. Fish and Wildlife Service – Twin Cities Ecological Services Field Office	No response to date
Federal Aviation Administration	July 9, 2019 (Agency response)
State	
Minnesota Historical Society – State Historic Preservation Office	March 22, 2019 (Agency response) July 3, 2019 (Agency response)
Minnesota Department of Natural Resources (MNDNR)– Region 4 (Southern Region)	March 15, 2019 (Agency response) May 17, 2019 (Agency response) June 14, 2019 (Agency response)
MNDNR – Natural Heritage Information System Review	August 19, 2019

Table 5.1-1
Elk Creek Solar Agency Correspondence

Agency	Response Date (Type)
Minnesota Department of Agriculture – Energy and Environment Section	March 5, 2019 (Agency response) April 9, 2019 (Meeting) August 28, 2019 (Agency response) September 11, 2019 (Agency response)
Minnesota Department of Transportation – Office of Land Management	March 5, 2019 (Agency response) May 9, 2019 (Meeting)
Minnesota Department of Employment & Economic Development	No response to date
Minnesota Pollution Control Agency – Brainerd Office	No response to date
County	
Rock County	May 22, 2019 (Agency response) June 19, 2019 (Letter of support) July 24, 2019 (Agency response) July 27, 2019 (Agency coordination) September 12, 2019 (Agency coordination)
Rock County Soil and Water Conservation District	June 10, 2019 (Agency response)
Local Government Units	
City of Luverne – City Administrator	June 3, 2019 (Letter of support)
Luverne School District	No response to date

5.1.1 Federal Agencies

5.1.1.1 U.S. Army Corps of Engineers

On May 30, 2019, the USACE responded to the Project introduction letter and provided information regarding the potential permitting process for the Project including requirements under Section 10 of the Rivers and Harbors Act, Sections 404 and 401 of the Clean Waters Act, as well as additional consultations that may be required for the Project.

Elk Creek will work with the USACE on wetland impacts; these impacts are anticipated to be authorized under NWP 51 – Land-Based Renewable Energy Generation Facilities.

5.1.1.2 Federal Aviation Administration

As noted in Section 4.2.9, Elk Creek filed FAA 7460-1 Notice of Proposed Construction forms for the perimeter of the Land Control Area. On July 9, 2019, the FAA 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.

5.1.2 State Agencies

5.1.2.1 Minnesota State Historic Preservation Office

As discussed in Section 4.4, Elk Creek submitted a copy of its Phase I cultural resources inventory report to the Minnesota SHPO in May 2019. On July 3, 2019, the Minnesota SHPO responded and concurred with Area M's recommendations that the Project would not affect historic properties listed in or eligible for listing in the NRHP.

5.1.2.2 Minnesota Department of Natural Resources

The MNDNR responded to Elk Creek's Project notification letter on March 15, 2019 and provided copies of guidance documents the MNDNR has prepared for commercial solar projects, "Commercial Solar Siting Guidance" and "Prairie Establishment and Maintenance Technical Guidance for Solar Projects." These documents contain general guidelines and standard recommendations specific to commercial-scale solar projects. The agency advised that a significant amount of surface drainages and farmed wetlands are present within the Project site. The agency recommended that Elk Creek construct the solar facility during the months of July, August, and September, and establish a cover crop several months prior to the star of construction, to reduce the potential for major construction issues related to surface runoff, water retention in farmed wetlands, and wet soils. In addition, the agency recommended that, following construction of the facility, a diverse mix of native species be established to stabilize soils and provide long-term pollinator habitat.

On May 17, 2019, the MNDNR provided a response to Elk Creek's letter noting a change in the Project boundary. The agency advised that Elk Creek submit a NHIS request when the final Project boundary is known. In this correspondence, the agency provided an updated contact for Project reviews and advised that the previous contact for the Southern Region retired in spring 2019.

Elk Creek contacted the MNDNR on May 23, 2019 to request review of seed mixes that would be used to restore the Project area after the Project facilities are installed. On June 14, 2019, the MNDNR responded with approval of the seed mixes proposed by Elk Creek.

On August 19, 2019, the MNDNR NHIS program provided a response for rare species or other significant natural features known to occur within a one-mile radius of the Elk Creek Solar Project. The state agency noted records of Topeka shiner (federally-listed endangered and state-listed special concern) and plains topminnow (state-listed threatened) have been documented in the vicinity of the Project. Additionally, Elk Creek is federally designated as critical habitat for the Topeka shiner. MNDNR notes that these fish species are adversely impacted by actions that alter stream hydrology or decrease water quality. Therefore, the Project should not negatively affect the water quality of Elk Creek and its tributaries by implementing comprehensive erosion and sediment control measures. As noted in Section 4.5.8.4, Elk Creek will implement the USFWS' "Recommendations for Project Affecting Waters Inhabited by Topeka Shiners (*Notropis topeka*) in Minnesota."

5.1.2.3 Minnesota Department of Agriculture

On March 5, 2018, the MDA responded to the initial Project notification letter and requested a meeting with Elk Creek to discuss the Project and the siting decision process to date.

Elk Creek met with representatives of the MDA on April 9, 2019 to discuss the Project. Elk Creek and MDA discussed the Project's need to develop an AIMP and reviewed the AIMP's contents and site-specific characteristics. On August 8, 2019, Elk Creek Solar provided a draft of the Elk Creek AIMP to MDA; MDA reviewed and provided comments on the draft AIMP on August 28, 2019. Elk Creek provided a redline version of the final AIMP, including updates to address the agency's comments on September 11, 2019. The final AIMP is included as Appendix C.

5.1.2.4 Minnesota Department of Transportation

MNDOT provided early review comments on the Project on March 5, 2019. In these early comments, MNDOT noted that the Project is not proximal to a state trunk highway; therefore, the permitting for the Project may be limited to oversize/overweight permits. Elk Creek held a follow-up meeting with MNDOT on May 9, 2019. MNDOT indicated Elk Creek would need to coordinate on oversize load permits should they be required for delivery but otherwise did not have concerns with the Project as no trunk highways are located in proximity to the Land Control Area.

5.1.3 Rock County and Local Government Units/Stakeholders

Elk Creek Solar attended the Rock County Board meeting on June 4, 2019 to provide an overview of the Project and hosted an informational meeting on the same day to introduce the Project to landowners within a half mile of the Land Control Area in addition to LGUs. Attendance from LGU representatives at these meetings is summarized in Table 5.1-1.

5.1.3.1 Rock County

On May 22, 2019, Elk Creek received a response to its Project introduction letter from Rock County. In its response, Rock County noted that the Project is the first solar facility development project in the county and listed a number of questions and potential permit requirements. Since the initial response was received from Rock County additional coordination has occurred including the transmittal of the recently adopted Rock County Renewable Energy Ordinance, which has been utilized for the preliminary design setbacks and further coordination on permits and approvals that will be required for the Project.

On June 19, 2019, Elk Creek received a letter of support from the Rock County Board of Commissioners. The Board of Commissioners stated that the Project represents, "…cost effective renewable energy generation, and we look forward to the project adding economic development to our region." The Board of Commissioners further commented on the long-term economic benefits of the Project in the form of tax payments to Rock County and local townships, additional funding for local school districts via the Elk Creek Education Fund, and the addition of full-time employment positions in the area.

On July 24 and 31, 2019, Elk Creek coordinated with Rock County regarding its questions on local permits and on September 12, 2019 Elk Creek and Rock County coordinated at which time Elk

Creek to apply for and secure conditional use permits for the temporary laydown areas and the O&M building prior to construction.

5.1.3.2 Rock County Soil and Water Conservation District

On June 10, 2019, the Rock County TEP provided a Notice of Decision concurring with the wetland boundaries in the wetland delineation report (Appendix E). Elk Creek will coordinate with Rock County TEP for impacts to the delineated wetland in the Land Control Area under the Minnesota WCA.

5.1.3.3 City of Luverne

On June 3, 2019, Elk Creek received a letter of support from the City of Luverne. The City Administrator of Luverne stated that development of renewable energy would boost local economies, create jobs, improve the tax base, and, "…contribute to the overall well-being in our region."

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