Public Utilities Commission
Application for a Site Permit
for the up to 160 MW
Elk Creek Solar Project

Elk Creek Solar, LLC

Rock County, Minnesota

Docket No. IP-7009/GS-19-495

August 29, 2023

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF IMAGES

LIST OF FIGURES

APPENDICES

ACRONYM LIST

2016 PBO	U.S. Fish and Wildlife Service's 2016 programmatic biological opinion for the northern long-eared bat.
2019 Application	Elk Creek Solar, LLC's 2019 Site Permit Application.
2020 Project	The Elk Creek Solar Project as described in the 2020 Site Permit.
2020 Site Permit	On December 31, 2020, the Commission issued Orders approving the Certificate of Need and Site Permit for the Elk Creek Solar Project, under Docket Nos. IP-7009/CN-19-351 and IP-7009/GS-19-495, respectively. At that time, the Project was proposed as a solar energy conversion facility with an 80-megawatt alternating current nameplate capacity.
2020 Land Control Area	The approximately 976-acre area of privately-owned land for which Elk Creek Solar, LLC received a Site Permit from the Commission in 2020 to develop the Elk Creek Solar Project.
2020 Preliminary Development Area	The approximately 681-acre area for which Elk Creek Solar, LLC received a Site Permit from the Commission in 2020 to install the Elk Creek Solar Project facilities.
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
ASIS	Aggregate Source Information System
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
CAA	Clean Air Act
CN	Certificate of Need
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
Commission	Minnesota Public Utilities Commission
CSAH	County State Aid Highway
CWI	County Well Index
dB	decibels

dBA	A-weighted decibels
DOI	U.S. Department of the Interior
DC	direct current
DKey	Determination Key
DPP	Definitive Planning Phase
ECS	Ecological Classification System
Elk Creek or 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
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
FR	Federal Register
g CO_2e/kWh	grams carbon dioxide equivalent per kilowatt hour
gen-tie	generation interconnect
GHG	greenhouse gas
GIS	Geographic Information System
GPS	Global Positioning System
IPaC	Information for Planning and Conservation
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolt
kWh	kilowatt hour
L_{10}	ten percent of any hour
L_{50}	fifty percent of any hour
Land Control Area	Approximately 1,522-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. This area is inclusive of the 2020 Land Control Area.
LGU(s)	local government unit(s)
MBTA	Migratory Bird Treaty Act
MBS	Minnesota Biological Survey
MCE	Minnesota Conservation Explorer
MDH	Minnesota Department of Health
mG	milliGauss
MISO	Midcontinent Independent System Operator

MNDNR	Minnesota Department of Natural Resources
MDA	Minnesota Department of Agriculture
MN DEED	Minnesota Department of Employment and Economic Development
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NFHL	National Flood Hazard Layer
NG Renewables	National Grid Renewables Development, LLC
NGEA	Next Generation Energy Act
NHIS	Natural Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NLEB	northern long-eared bat
NFMP	Nitrogen Fertilizer Management Plan
NO_2	nitrogen dioxide
NPC	native plant community
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 1,161-acre that falls entirely within the Land Control 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
SIS	System Impact Study

SO_2	sulfur dioxide
SOBS	Sites of Biodiversity Significance
Solar Guidance	Minnesota Department of Natural Resources Commercial Solar Siting Guidance (Revised 2023).
SPCC Plan	Spill Prevention, Control, and Countermeasures Plan
SPP	Southwest Power Pool
SSA	sole source aquifer
SSURGO	Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
TEP	Rock County Technical Evaluation Panel
tpy	tons per year
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
WEG	Wind Erodibility Group
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	4.8
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 National Grid Renewables Development, LLC (NG Renewables) respectfully submits this Site Permit Application (Application) to the Minnesota Public Utilities Commission (Commission or MPUC) requesting a Site Permit for up to 160-megawatt (MW) alternating current (AC) for the Elk Creek Solar Project (Project) pursuant to the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E) and Minnesota Administrative Rules Chapter 7850.

In September 2019, Elk Creek submitted applications to the Commission for a Certificate of Need (CN) and a Site Permit for the Elk Creek Solar Project. The Commission issued Orders approving the CN and Site Permit on December 31, 2020, under Docket Nos. IP-7009/CN-19-351 and IP-7009/GS-19-495, respectively. At that time, the Project was proposed as a solar energy conversion facility with an 80 MW AC nameplate capacity located on 976 acres (2020 Project). In this Application, Elk Creek is requesting a site permit that would allow construction of the Project on 1,522 acres to accommodate an increase in the nameplate capacity of the Project to the full 160 MWs that Elk Creek has executed Generation Interconnection Agreements for with the Midcontinent Independent System Operator (MISO) and transmission owner. Elk Creek has two executed agreements for 80 MW each.

The Project is in Vienna and Magnolia Townships, Rock County, Minnesota (see Figure 1 – Project Location). Under the current proposal, the Project will generate up to 160 MW, enough energy to provide electricity for approximately 27,600 homes annually and avoid the emission of approximately 219,000 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 2025. Additional details about the regulatory background of the Project are provided in Section 1.1 and a detailed description of the current Project proposal is provided throughout this Application.

Elk Creek is a wholly owned subsidiary of NG Renewables. NG Renewables is a utility-scale renewable energy development company headquartered in Bloomington, Minnesota that has developed multiple operating wind farms and solar facilities throughout the United States. NG Renewables currently has approximately 1,300 MW of wind and solar projects under construction. NG Renewables has a multi-gigawatt development pipeline of wind and solar projects in various stages of development throughout the United States and 97 utility-scale and community solar projects completed. NG Renewables provides custom renewable energy development solutions for utilities, independent power purchasers and corporations looking to harness renewable energy for business growth. NG Renewables prides itself on developing wind farms and solar facilities that are farmer-friendly, community-driven, and beneficial for rural communities.

1.1 Project Background, Purpose, and Need

Elk Creek submitted applications to the MPUC for a CN and Site Permit for the 2020 Project in September 2019. The Commission issued an Order approving the CN and Site Permit for the

[1] Based on EPA Greenhouse Gas Equivalencies Calculator and 309,000,000 kWh (309,000 MWhs) annual production PVSYST model.

Project on December 31, 2020. As described in Elk Creek's September 2019 application (2019 Application), Elk Creek entered into a 20-year power purchase agreement (PPA) with Northern States Power Company, doing business as Xcel Energy (Xcel Energy) for the 2020 Project that was intended to serve a portion of Xcel Energy's Renewable*Connect Program.[2] Xcel Energy initiated the process of seeking Commission approval of the Elk Creek PPA by filing the PPA on September 10, 2019 in a separate docket.[3] The Commission issued an Order approving the Elk Creek PPA, with conditions, on November 24, 2020. However, repeated delays in approval of Elk Creek's MISO interconnection request led to subsequent delays in the target commercial operation date of the Project, forcing Elk Creek to pursue other options for satisfying the supply obligations under the Elk Creek PPA.

The 2020 Project was part of the April 2018 Definitive Planning Phase (DPP) study in MISO's generator interconnection queue. The MISO interconnection queue studies determine if there is available transmission capacity to accommodate the interconnection of a new generation facility. There have been significant delays and uncertainties for renewable energy projects due to the MISO interconnection queue process. Elk Creek's interconnection application to MISO is no exception. When the DPP study began for Elk Creek's application in 2018, the DPP 3 System Impact Study (SIS) was scheduled to be completed in May 2020. The study cycle concluded in December 2022, significantly behind schedule. Thus, Elk Creek was not able to meet its original target commercial operation date of December 31, 2021, as required under the original Elk Creek PPA.

In the second quarter of 2021, MISO informed Elk Creek, pursuant to the MISO 2018 DPP Southwest Power Pool (SPP) Affected System Study, that the Project would have zero power injection rights into the MISO system. The continued processing of the Elk Creek interconnection application in the SPP affected system studies were significantly delayed, due to a restudy obligation imposed on SPP by Federal Energy Regulatory Commission (FERC), related to SPP's wrongful removal of an unrelated solar project from a prior study. Elk Creek and Xcel Energy negotiated an extension of the target commercial operation date under the Elk Creek PPA due to the MISO queue delays.

Prior to completion of the DPP 3 SIS, Elk Creek and Xcel Energy realized that further delays in the MISO DPP 3 SIS would not allow Elk Creek to achieve commercial operation by the amended target commercial operation date required under the Elk Creek PPA. The further delay would also preclude Xcel Energy from achieving its planned expansion of its Renewable*Connect expansion program in a timely manner. In an effort to mitigate the impact of the MISO queue delays and the uncertainty as to the timing of the release of the final study results, NG Renewables acquired two projects within the MISO territory that possessed full interconnection rights to serve the supply obligations under the Elk Creek PPA. Elk Creek and Xcel Energy agreed to substitute these two projects for the Elk Creek Project. NG Renewables is committed to bringing the two projects online

[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] 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)

as soon as possible to meet a portion of the load needs under the Renewable*Connect expansion program.

The completed SPP Affected System Study, which was released in December 2022, confirmed that Elk Creek does, in fact, have power injection rights into the MISO system. However, because two other projects were substituted for the Project under the Elk Creek PPA, Elk Creek does not currently have a contract in place to sell power generated by the Project. Elk Creek continues to market the Project for a new contract to sell the Project's power and will update the Commission when a new contract is secured.

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 (2022). On May 19, 2023, at the request of EERA staff, Elk Creek submitted a revised size determination request based on updating the Project size to 160 MW. 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.

Via this Petition (Application), Elk Creek is requesting a site permit to construct and operate the up to 160 MW Project on 1,522 acres to construct and operate an up to 160 MW solar facility in Rock County, Minnesota. Information in support of Elk Creek's request is provided throughout this Application. This request is for a new Site Permit; however, Elk Creek is willing to abide by the conditions outlined in the previously issued 2020 Site Permit.

1.2 Applicant Information

1.2.1 Permittee and Contact Information

The permittee for the Site Permit will be:

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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 NG Renewables. The land in the Land Control Area is currently owned by Chambers Family Farms, LLC, Harold and Joann Marie Schneiderman, David Tofteland, Jeffery Westgor, Boardman Family Farms, LLC, G&R Farms, LLC, Trustees of Gary Overgaard, Benjamin Thompson, and Marina Thompson.

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 by the Spring of 2024.
- **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 Procurement:** Elk Creek is in the process of evaluating and procuring solar equipment for the Project facilities. The equipment will be allocated to the Project based on meteorological and economic analysis to achieve the best match of technology for the facility location.
- **Construction:** Elk Creek anticipates that construction will begin as early as Q2 of 2024 with a targeted completion in Q4 of 2025. 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 Q4 2025, following the completion of construction.
- **Commercial Operations:** Commercial operation for the Project is scheduled to begin in Q4 of 2025, following the completion of construction and testing.

1.4 Required Project Permits

1.4.1 Certificate of Need

A CN 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 CN 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 CN prior to issuance of a Site Permit and construction. However, the Project is exempt from CN requirements because it is a solar energy generating system, as defined in section 216E.01, subdivision 9a and the Project is being developed and permitted by an independent power producer, Elk Creek, under chapter 216E.[4]

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 unless an exemption applies	Not required due to the project qualifying for an exemption.
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

[4] On May 24, 2023, Governor Walz signed H.F. 2310 into law. H.F. 2310 amends Minn. Stat. Section 216B.243, subd. 8 to exempt projects permitted by independent power producers, such as Elk Creek, from certificate of need requirements. See H.F. 2310 lines 353.25- 355.14, inclusive.

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 (SHPO)	Review and Coordination	Provide concurrence on Phase I inventory	Partially complete. The addendum report will be submitted in June 2023; SHPO approval of the recommendation of no historic properties affected is pending.
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 Preliminary Development Area
	Conditional Use Permit	Required for construction within Rock County	To be obtained prior to construction for the O&M building and laydown areas
	County Entrance Permit	Required for access from county roads	To be obtained prior to construction

Table 1.4-1 Potential Permits/Approvals

Agency	Permit	Applicability	Permit Status and Timing
	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 160 MW solar photovoltaic (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 together with approximately 976 acres of the overall Land Control Area that previously received a site permit from the Commission for an up to 80 MW solar energy conversion system. 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

Within the Land Control Area, Elk Creek is proposing to build a solar facility with up to 160 MW AC nameplate capacity on up to 1,522 acres of privately-owned land for which Elk Creek has obtained leases, easements and purchase options (2023 Land Control Area) in Sections 27, 34, and 35, Township 103 North, Range 44 West, and Section 3, Township 102 North, Range 44 West, Rock County, Minnesota (see Figure 1 – Project Location). The Project facilities will cover approximately 1,161 acres of the Land Control Area (Preliminary Development Area). There are approximately 360 acres of the Land Control Area for which Elk Creek has site control, but are currently not contemplated for occupation by solar facilities (see Figure 2 – 2023 Land Control and Preliminary Development Areas); this portion of the Land Control Area is currently under lease with the underlying landowner but will be excluded from the area leased by Elk Creek during operation of the Project. The underlying landowners can then continue to farm the area released from the lease for the life of the Project.

Elk Creek was authorized in the 2020 Site Permit to construct the up to 80 MW solar facility in Sections 27, 34, and 35, Township 103 North, Range 44 West, in Vienna Township, Rock County, Minnesota. Elk Creek's 2020 Land Control Area included 976 acres of leases, easements, and purchase options on privately owned land, which is included within the 2023 Land Control Area. The project design in the 2020 Site Permit covered approximately 681 acres of the 2020 Land Control Area (2020 Preliminary Development Area). Table 2.2-1 provides a comparison of the 2020 Land Control and Preliminary Development Areas.

Table 2.2-1
Comparison of Project Land Control and Preliminary Development Areas

Comparison Factor	2020 Land Control Area (acres) [1]	2020 Preliminary Development Area (acres) [1]	Land Control Area (acres)	Preliminary Development Area (acres)
Nameplate Capacity	80 MW		160 MW	
County, Township	Rock County, Vienna Township		Rock County, Vienna and Magnolia Townships	

Table 2.2-1
Comparison of Project Land Control and Preliminary Development Areas

Comparison Factor	2020 Land Control Area (acres) [1]	2020 Preliminary Development Area (acres) [1]	Land Control Area (acres)	Preliminary Development Area (acres)
Township/Range/Section	T 103N, Range 44W, Sec. 27, 34 and 35		T 103N, R 44W, Sec. 27, 34, and 35; and T 102N, R 44W, Sec. 3	
Acres	976	681	1,522	1,161
Acres per MW	Not applicable	8.5 acres per MW	Not applicable	7.3 acres per MW

1 The 2020 Land Control Area and 2020 Preliminary Development Area information is provided for reference purposes only and reflects what was approved in the 2020 Site Permit.

The Project is located 0.7 miles north of Magnolia. Elk Creek selected the 2020 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). The additional approximately 546 acres of the Land Control Area was chosen based on its proximity to the 2020 Land Control Area. The entire 1,522 acre Land Control Area allowed Elk Creek to design the up to 160 MW solar facility on less land than would be required if two separate 80 MW projects were constructed in separate locations.

In this Application, Elk Creek is providing a preliminary Project layout that would work for a below-ground electrical collection system or a hybrid option that has a combined below-ground and above-ground electrical system; the array layout for both options would be the same and is shown on Figures 3 – Preliminary Project Layout and 4a-4k – Detailed Preliminary Project Layout and displayed in more detail in Appendix B – Site Plan. For both the below-ground and hybrid options, the AC collection line that would connect the northern unit to the Project substation (located in the central unit) may be installed either below-ground or above-ground.

The preliminary Project layout is within the Preliminary Development Area and is subject to final micrositing. The preliminary Project layout includes solar panels and racking, inverters, security fencing, Project substation, an operations and maintenance building (O&M building), on-site below-ground or hybrid below-ground/above-ground electrical collection and communication lines, and up to five weather stations (up to 20 feet tall). There are seven laydown areas proposed in the preliminary Project layout.

This preliminary Project layout 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. Elk Creek has reduced row spacing and included more efficient (i.e., higher nameplate capacity) solar panels than that considered in the 2020 Site Permit, which has led to a reduction in the area required for the original 80 MW Project and use of portions of the 2020 Land Control Area to host portions of the additional 80 MW being added to the Project. The result is a more efficient design that requires less land than two standalone 80 MW projects. For example, the 2020 Site Permit design required approximately 8.5 acres per MW for Project facilities. The revised layout, presented in this application, utilizing the Preliminary Development

Area requires approximately 7.3 acres per MW. More efficient use of the land reduces prime farmland impacts from the Project and decreases the amount of agricultural land that will be taken out of production for the life of the Project (currently estimated as 30 years).

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 the preliminary layout presented in Figure 3 (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. In its Order issuing the 2020 Site Permit, the MPUC concurred with Elk Creek that there was no feasible or prudent alternative to the Project. The Preliminary Development Area is sited on prime farmland (see Section 4.5.3). Given the 160 MW net generating capacity of the Project, this rule would allow use of up to 80 acres of prime farmland for the Project. Approximately 885.0 acres of prime farmland and 259.3 acres of prime farmland if mitigating factors are addressed are located within the Preliminary Development Area. These acreages of prime farmland would be taken out of production for the

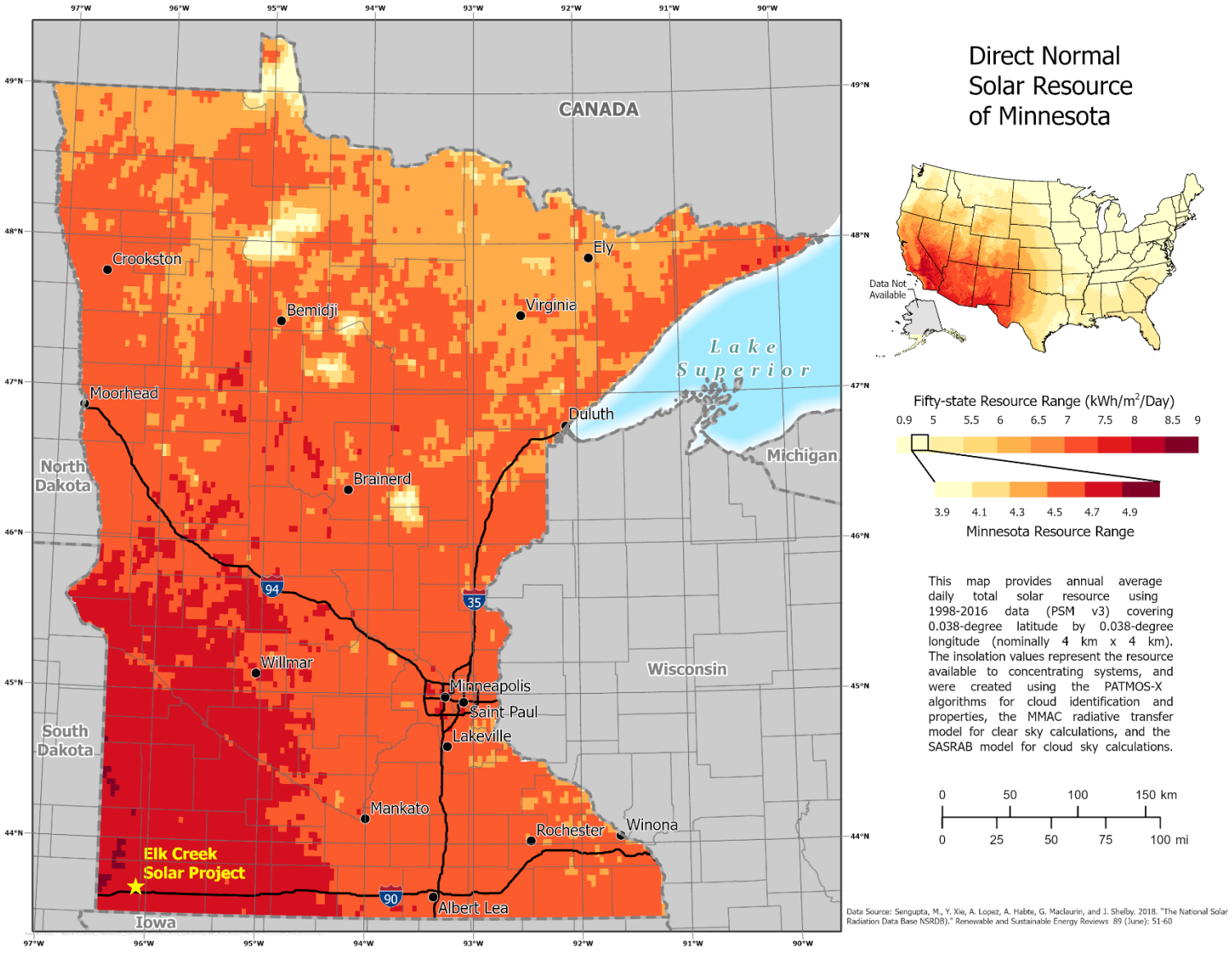
life of the Project, but as described below would not be permanently removed. This Project is an addition to and relies upon the 2020 Land Control Area to create one comprehensive and integrated Project. As noted above, the expansion of the 2020 Land Control Area for the Project results in a more efficient design that requires less land than two standalone 80 MW projects. More efficient use of the land reduces prime farmland impacts from the Project and decreases the amount of agricultural land that will be taken out of production for the life of the Project. Accordingly, no analyses of potential alternatives is relevant or otherwise considered in this Application.

2.3.1 Selection of the Land Control Area

When searching for the original 2020 Land Control Area, Elk Creek explored Rock County for a solar project based on the high solar resource in this portion of the state (see Image 1 – Direct Normal Solar Resource of Minnesota) (Sengupta et. al., 2018) and the positive experiences its parent company, NG Renewables formally known as Geronimo Energy, had in developing the Prairie Rose Wind Farm (operational in December 2012). This exceptional solar resource and NG Renewables' 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.[5] 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 sufficient 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 the entire 160 MW Project and associated facilities; thereby reducing the need for new transmission infrastructure to a line that is currently estimated to be 500 feet, but in any event less than 1,500 feet. .

[5] 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



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 5 (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, 2023b). In Rock County, approximately 91 percent of the soils are classified as prime farmland as defined under 7 Code of Federal Regulations 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 (see Figure 6 – Regional Prime Farmland). Accordingly, there is no area in either county, let alone within an area within five miles of the Magnolia Substation, that is conducive to solar development of approximately 1,161 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.

In its Order issuing the 2020 Site Permit, the MPUC concurred with Elk Creek, based on a similar analysis as that described above, that there was no feasible or prudent alternative to the Project. This Project is an addition to and relies upon the 2020 Land Control Area to create one comprehensive and integrated Project. As noted above, the expansion of the 2020 Land Control Area for the Project results in a more efficient design that requires less land than two standalone 80 MW projects. More efficient use of the land reduces prime farmland impacts from the Project and decreases the amount of agricultural land that will be taken out of production for the life of the Project. Accordingly, no additional analysis of potential specific alternatives is relevant or otherwise considered in this Application. A continued finding that there is no feasible and prudent alternative to the Project is consistent with the Commission's Order issuing the 2020 Site Permit and other decisions for large solar generating systems sited in prime farmland due to the fact that areas surrounding the Project substation, and within a radius of the substation within which electrical transmission systems remain cost-effective, also contain similar amounts of prime farmland as the proposed 6 Elk Creek has prepared an Agricultural Impact Mitigation Plan (AIMP) (see Appendix C) for the Project to account for the entire 160 MW Project and associated Land Control Area. The updated AIMP details 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, 2023a).

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

[6] 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).

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 (EPA) (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 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, updated in 2015, and eventually addended in July 2019 in response to comments received during development of the Groundwater Protection Rule, which took effect on June 28, 2019 (MDA, 2019a). Under the Groundwater Protection Rule (MDA, 2023b) the MDA does not implement regulatory aspects of the NFMP at the township level, instead now regulating only the voluntary elements of the NFMP at the township level. The Groundwater Protection Rule includes restrictions to fall application of nitrogen fertilizers in designated vulnerable groundwater areas and in designated drinking water supply management areas (DWSMAs), as well as voluntary and regulatory actions to be taken in DWSMAs that already have elevated nitrate levels. MDA has developed interactive online mapping and other tools to help landowners understand their responsibilities under the Groundwater Protection Rule (MDA, 2023b). Review of the MDA's mapping site shows the parcels within the Land Control Area do not have fall nitrogen fertilizer application restrictions.

The MDA determines current nitrate-nitrogen concentrations in private wells, on a township scale, through the Township Testing Program (MDA, 2023c). 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 and 2017, including Vienna and Magnolia Townships, which are within the Land Control Area (MDA, 2022; MDA, 2019b). According to the MDA's Final Township Testing Report for Rock County (2019b), all seven townships sampled in Rock County have 10 percent or more of wells over the Health Risk Limit (> 10mg/L Nitrate-N) for Nitrate-N, meaning nitrogen from fertilizer appears to be contaminating private wells, including drinking water (MDA, 2019b). More specifically, MDA's testing report indicates that approximately 1,846 people in the Rock County study have drinking

water that is over the nitrate Health Risk Limit (MDA, 2019b). MDA notes that fewer than 20 wells in each township participated in the sampling program, which the agency considers insufficient to fully characterize results at the township level. Regardless, in its testing report, MDA identified nitrate contamination as a significant problem in Rock County and these seven townships 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. As a result, vulnerable groundwater areas have been identified in Rock County and fall nitrogen fertilizer application restrictions have been placed on parcels within each of the seven townships reviewed in the MDA testing report (MDA, 2023d).

While nitrates in groundwater are a concern for water supply, a MPCA study found that 72 percent 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 50 feet), 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 via the Groundwater Protection Rule (MDA, 2023b).

While the State continues its work 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, as proposed in this Application, 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. Even though 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 additional land added to the 2020 Land Control Area to create the current Land Control Area. The 2020 Land Control Area was chosen because of its proximity to electrical transmission infrastructure, willing Project participants, 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 $277.2 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	$248.6 million
Development Expense	$ 10.5 million
Interconnection	$ 10.8 million
Financing	$ 7.3 million
Project Total	**$ 277.2 million**

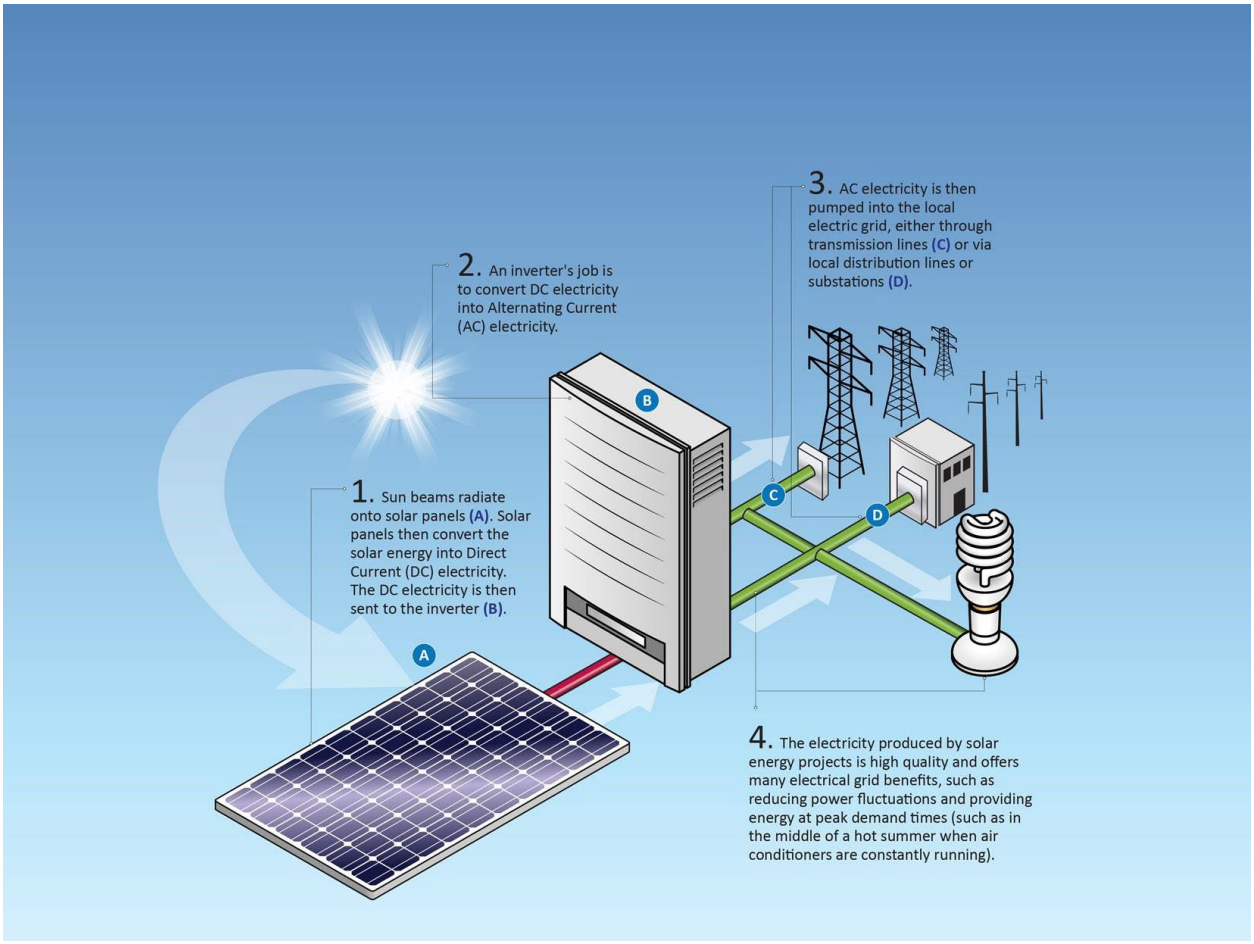
2.6 Future Expansion

Elk Creek has executed two 80 MW interconnection agreements. Elk Creek has no intention of expanding the Project beyond the 160 MW for which it has interconnection agreements.

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: National Grid Renewables Development, LLC

3.1 Design

Similar to the design approved in the 2020 Site Permit, the Project will utilize PV panels with tempered glass varying in size approximately 4 to 7 feet long by 2 to 4 feet wide, and 1 to 2 inches thick. PV panel dimensions have not changed significantly from that which was originally

proposed by Elk Creek. PV panel efficiencies have improved year over year and advances in solar panel technology have increased the available watts per square foot for energy production. Panels today can produce approximately 100 more watts than was possible in 2020. 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 (see 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. The PV panels will have a silicon and weatherized plastic backing or a side-mount or under-mount aluminum frame, heat strengthened front glass, and laminate material encapsulation for weather protection.

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

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 the need for excavation or concrete to install the piers. Piers are typically installed at eight to fifteen feet below the surface, pending site-specific conditions that will be determined through geotechnical borings prior to construction. Images 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

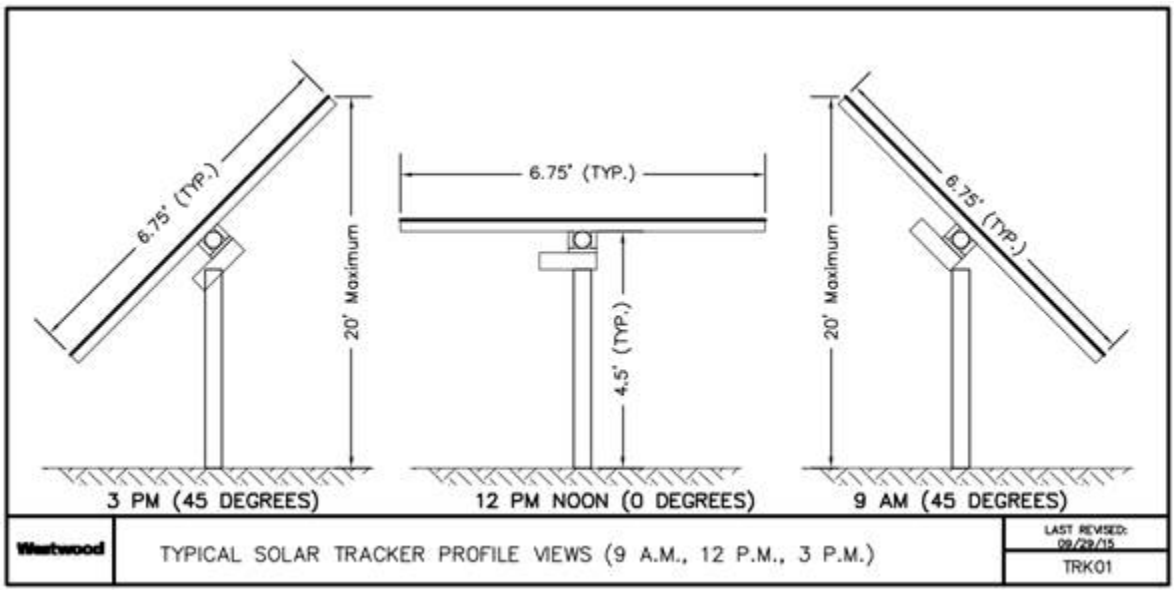


Image 5: Standard Steel Pier Foundations

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 or a hybrid of below-ground and above-ground. For both options, the AC collection line that would travel along 190th Avenue to connect the northern unit to the Project substation in the central unit may be installed either below-ground or above-ground, depending on final engineering design.

Electrical collection technology is rapidly evolving and will be site-specific depending on geotechnical analysis, constructability, costs, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system. The electrical cables that would be used for each type of electrical collection system are described below.

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. Once the cables are laid in the trench, the area will be backfilled with subsoil followed by topsoil.

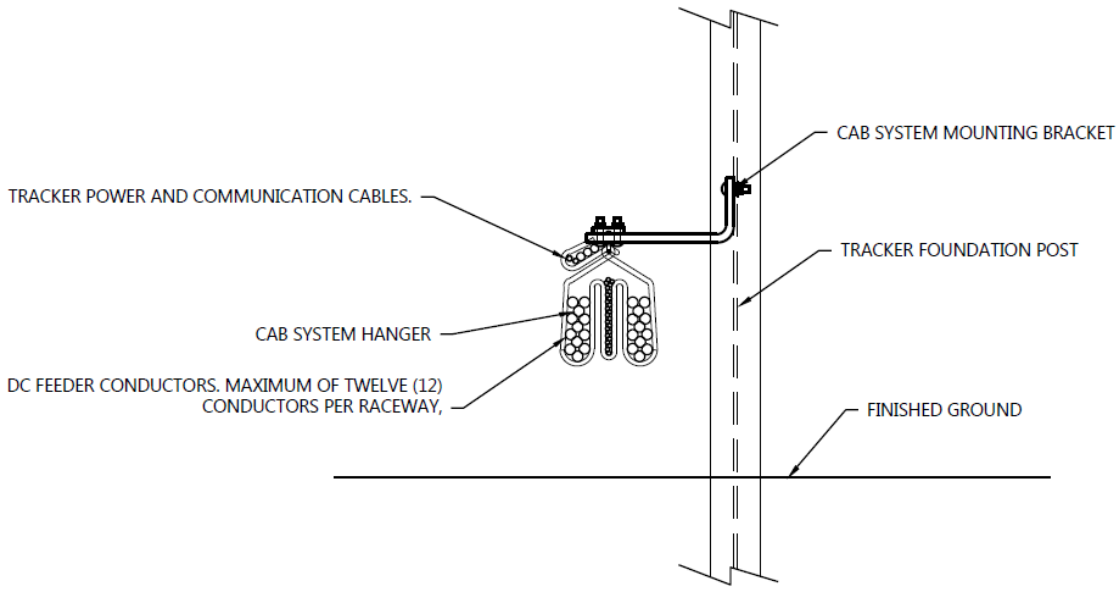
As noted above, the AC collection line connecting the northern unit to the Project substation may be installed either below-ground or above-ground, depending on final engineering design. If installed above-ground, the AC collection line would be moved above-ground just outside of the fenced area via a riser installed in the southeastern corner of the northern unit, near the intersection of 190th Avenue and 141st Street. Approximately 15 poles spaced roughly 300 feet apart would be installed along the west side of 190th Avenue. The first pole would be just outside the fenceline of the northern unit, and the collection line would extend for about 0.6 mile before turning east, crossing over 190th Avenue, and connecting to another pole installed adjacent to the fenceline of the central unit. From here, the collection line would be moved below ground as it continues to the Project substation. Elk Creek plans to install AC collection from the southern unit to the Project substation in the central unit below-ground.

The preliminary design includes two pole types (wooden double-circuit tangent and steel dead-end structure) to avoid and minimize environmental impacts on agricultural activities. The double circuit tangent poles are made of wood, approximately 60-feet tall, have a diameter of 18 inches, and will be direct embed. Tangent poles are sometimes referred to as “straight-through” poles as they are generally used along relatively straight portions of a line. Tangent poles used for the Project will carry collection cables on one side of the pole to minimize the width of the collector right-of-way used by the Project. Tangent poles are used for the majority of the corridor from the northern unit along 190th Avenue. Steel dead-end double circuit poles are made of steel, approximately 60-feet tall, have a diameter of up to 6 feet, and will require concrete foundations. These dead-end structures are used for road crossings and in certain soil conditions where excess strain is placed on the pole or its components. Placement of double circuit tangent and dead-end poles are included on Figures 3 – Preliminary Project Layout and 4a -4k – Detailed Preliminary Development Area and Appendix B – Site Plan. The pole placement included in this Application is preliminary and final locations will be determined based on final engineering and geotechnical analysis.

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

A hybrid above-ground and below-ground electrical system is being considered for the Project for several reasons including ease of access for operations and maintenance, reduced ground disturbance, and cost considerations. If above-ground cabling is utilized, the DC collection lines 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 6.

Image 6: Typical Above-Ground DC Collection Hanging Bracket



From the inverter/transformer skids, AC collection lines would be installed below ground to the Project substation. As noted above, the collection corridor between the northern unit and the central unit may be installed above-ground, depending on final engineering design; a description of the above-ground collection line between the northern and central units is provided in Section 3.1.2.2. Elk Creek plans to install the AC collection system between the southern unit and the central unit below-ground.

3.1.2.3 Central Inverter/Transformer Skids

Regardless of the collection system configuration (below-ground or hybrid), the Project will utilize central inverter/transformer skids at locations throughout the Project and include a transformer to which the inverters will feed electricity (see Image 7). The final number of inverters for the Project will depend on the inverter size, as well as inverter and panel availability. The Project's preliminary design proposes 89 central inverter skids (one inverter is required for every 2-3 MW). These skids provide the foundation for the inverter, transformer, and Supervisory Control and Data Acquisition (SCADA) system. The skids will be placed atop a concrete slab or pier foundations and typically measure 10 feet wide by 25 feet long, with a structure height of approximately 12 feet above grade. 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 7 below shows a central inverter and step-up transformer station.

Image 7: Typical Inverter and Transformer Station

3.1.3 Access Roads

The Project will include approximately 11.1 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 nine access points to the Project from existing county roads. These entrances will have locked gates.

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

Some upgrades or other changes to the public roads may be required for construction or operation of the Project. 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 use and improvements will be incorporated into a Development Agreement with Rock County. Elk Creek executed a Development Agreement with Rock County in September 2021 for the 80 MW project that received a Site Permit in 2020. Under that agreement, Vienna and Magnolia Townships executed Resolutions that approved Rock County to act on its behalf. Elk Creek will continue to coordinate with these agencies to update the Development Agreement for the Project. 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. As previously proposed in the 2019 Application and previously reviewed by the MNDNR, the fencing will consist of an agricultural woven wire fence and will extend approximately 7 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 for a total height of approximately 8 feet above grade. Additional gates will be strategically installed at corners for deer egress and contact information for the site manager will be posted at the gates. 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 downlit. 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 downlit 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, MISO 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; operating area for the substation has not changed since the 2020 Site Permit was issued.

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

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 28 drainage basins throughout the Preliminary Development Area that range in size from 0.3 to 5.5 acres (see Figures 3 and 4). 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 five weather stations up to 20 feet in height (see Image 8 below). Weather stations will be within the Preliminary Development Area; the final locations will be determined following final engineering.

Image 8: Weather Station

3.1.6 Temporary Facilities

Elk Creek will utilize seven temporary laydown areas within the Preliminary Development Area, totaling 11.2 acres. These areas will serve both as a parking area for construction personnel and staging areas for Project components during construction. These laydown areas have been sited to avoid any tree clearing. After construction, 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 generation interconnect (gen-tie) transmission line of less than 1,500 feet. ITC Midwest plans to expand the existing Magnolia Substation approximately 250 feet to the south to accommodate interconnection of the Project (see Figures 3 and 4). The Magnolia Substation would expand into land that is currently row crop agriculture or otherwise maintained by ITC Midwest as part of the existing substation property. The associated interconnection infrastructure will be similar to what was approved in the 2020 Site Permit.

There will be a single dead-end structure within the Project substation and likely two to three additional structures to enter the Magnolia Substation with an overall length currently estimated to be approximately 500 feet, pending final engineering. The structures will be made of wood or steel 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 the overall length is 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'	42'
Non-participating residences	200'	274'
Road Right-of-Way	25'	40'
Public Conservation Lands	200'	The closest public conservation land is 3 miles west of the Project.

Source: Rock County, 2020

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 7 feet long by 2 to 4 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 1,161.3-acre Preliminary Development Area based on the preliminary design for the below-ground and hybrid below-ground/above-ground electrical collection configurations. The estimated Project facility acreages are the same for both options.

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

Project Facilities	Acres
Access Roads	22.1
Inverters	0.3
Project Substation and O&M Building	1.6
Laydown Areas	11.2 [1]
Solar Panels	841.6 [2]
Collection line between North, Central, and South Units	1.4
Stormwater Basins	44.2
Project Total	**922.4**

[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.

3.4 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 hybrid 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 2024 harvest season. Alternatively, and depending on construction timing, Elk Creek may plant a cover crop in Spring 2025 that is compatible with the Project's Vegetation Management Plan (VMP) (see 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 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 a below-ground system or hybrid above-ground/below-ground system.

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.

If a hybrid option is selected and 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. From the inverter/transformer skid, the AC collection would be installed below ground to the Project substation, as described above for the below-ground collection system.

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 will be near the site where the soil was removed, accurately located (GPS boundary, soil depth) and graded to facilitate revegetation. Subsoil will be removed, if necessary, to an acceptable pre-established 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 will occur among the Project's development, design, and construction teams. The construction manager will coordinate 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 (see Appendix C). The site will be seeded with site specific seed mixes developed in coordination with the MNDNR and the interagency Vegetation Management Plan Working Group and include four native seed mixes: a low growing mix in and around the solar arrays, a pollinator mix to be installed in the upland areas or the supplemental pollinator planting zone, a wet-mesic mix for transitional areas between hydric and non-hydric soils, and a wet mix for areas with hydric soils and/or susceptible to holding water based on field reviews (see 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 to five 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 five 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 will transfer from the construction team to the operations staff. The construction manager will work 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 30 years, and Elk Creek estimates that the Project will result in up to six 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 three 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. On 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 within the fenceline of the facility near 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.

A copy of the draft Decommissioning Plan for the Project is provided in Appendix D.

3.6.1 Timeline

Decommissioning is estimated to take 13 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

Financial assurance will begin in year 10 and the surety will provide for full decommissioning costs prior to the expiration of any PPA and the operational life of the Project. During the 10th year of operation, Elk Creek will enter into a surety bond agreement, create an escrow account, create a reserve fund, 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. Elk Creek will decommission the Project in accordance with the conditions outlined in the Site Permit. Elk Creek will notify the appropriate landowners and local governing bodies of the decommissioning schedule and has included an obligation to decommission the Project components in applicable lease and easement agreements.

4.0 ENVIRONMENTAL INFORMATION

For the discussion of environmental context and effects throughout Section 4.0, the following terminology, assumptions, and approach are used.

The description of existing conditions throughout Section 4.0 is focused on the 1,522-acre Land Control Area; this reflects the fact that final design may necessitate development in areas within the overall 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 to calculate the distance of these features from anywhere within the portion under Elk Creek's control.

The approximately 1,161-acre Preliminary Development Area is used to describe areas of temporary impact throughout Section 4.0. The Preliminary Development Area is the area that preliminary Project design indicates is needed for construction and operation of the solar facility. For some resources, such as land cover, the Preliminary Development Area is also used to describe "permanent impacts" (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 facility components such as access roads, inverters, Project substation, and O&M building.

It should be noted that preliminary design does not identify the locations of the posts for the solar arrays, so detailed calculations of impacts are not included for these features. However, because the posts of the solar arrays are anticipated to be installed via vibration or a pile driver in most 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 nine 18-inch diameter wooden tangent poles, four guyed terminal dead-end poles, and two self-supporting steel poles for the proposed above-ground collection lines between the northern and central solar array units is not included in the detailed calculations. The footprint for these poles is 25.5 square feet or less than one 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, 2023a). 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 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 1,995 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, 2023b).

The Project is in a rural area in Vienna and Magnolia Townships, approximately 0.7 mile north of Magnolia and 4.0 miles east of Luverne. Residences are scattered throughout the rural area where land use is dominated by agricultural fields, predominately corn planted in row crops. Other than 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 121st Street, and bisected by 131st and 141st Streets. 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 the central portion of the Land Control Area, as well. 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 Rock County which according to the 2020 U.S. Census, has a population density of 20.1 persons per square mile of land area (U.S. Census Bureau, 2021a). 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 4.0 miles west 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. 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 4.0 miles west of the Land Control Area (Minnesota Department of Public Safety, 2018).

4.2.1.1 Impacts and Mitigation

The Project will have minimal impacts on the security and safety of the local populace in Rock County. 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 4.0 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. EMF can occur indoors and outdoors. The general consensus is that electric fields pose no health risk to humans (Ministry of Health, New Zealand, 2013).

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 (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 as proposed in this Application 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 1 meter 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 on 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 275 feet from the solar arrays and 665 feet to the nearest inverter, electrical collection line, and transformer (see Table 4.2-4 in Section 4.2.4 and Figures 3 and 4). 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 northern and central portions of the Land Control Area. There is grain bin within the southern portion of the Land Control Area at a field edge along 190th Avenue.

4.2.2.1 Impacts and Mitigation

There is no potential for the proposed Project to displace residences. 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 occupied residences 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 meter
100	Jet flyover at 300 meters
90	Gas lawn mower at 1 meter
85	Food blender at 1 meter
75	Shouting at 1 meter
70	Vacuum cleaner at 3 meters
60	Normal speech at 1 meter
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, 2015

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 (L_{10}) and 50 percent of any hour (L_{50}). 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 (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 six 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	Sungrow 4400[1]	640 feet	72
	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

Table 4.2-3 Inverter and Tracker Noise Levels			
Facility Type	**Equipment Model**	**Distance to 50 dBA**	**dBA at 50 feet**
Inverter	Sungrow 4400[1]	640 feet	72
	TMEIC Solar Ware Ninja PVU-L0920GR	58 feet	51
	SMA Sunny Central 2750-EV-US	160 feet	60
	ABB PVS980	260 feet	64
[1] Noise estimates from the manufacturer are preliminary and conservative; therefore, the estimated distance to a dBA of 50 and dBA at 50 feet represent the worst-case scenario.			

The results of noise modeling conducted by technology manufacturers outlined in Table 4.2-3 show that noise levels will be less than 50 dBA at distances between 58 and 640 feet from the inverter, depending on which model is selected. Similarly, noise levels will be less than 50 dBA at distances between 5 and 82 feet from the trackers, depending on which model is selected. The Project has been designed to meet the nighttime L_{50} dBA noise standard, as the closest home to the facility is 275 feet away from the edge of a solar array. The distance of the nearest inverter to a residence is 665 feet (see Figures 3 and 4a – 4k). 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.

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 1,530 to 1,550 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 central portion of the Land Control Area (see Figure 3 – Preliminary Project Layout).

A 161-kV line runs east-west through Section 35 out of the Magnolia Substation and bisects the central portion of the Land Control Area (see Figure 9). 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 in the immediate Project vicinity.

There are no residences or businesses within the Land Control Area; however, there are eight residences and several agricultural buildings on parcels adjacent to the Land Control Area (see Figure 3). 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 2023 Preliminary Development Boundary (feet)**	**Distance to Solar Arrays (feet) [1]**	**Distance to Nearest Inverter (feet) [1]**
A	132	275	874
B	417	458	1,247
C	668	1,094	1,836
D	1,841	1,876	2,400
E	1,579	1,603	2,205
F	674	695	1,240
G	285	304	665
H	2,139	2,184	2,856
[1] Based on preliminary design.			

Residence A is 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 the east side adjacent to the Project.

Residence B is adjacent to the southwest corner of the central 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 adjacent to the southeast corner of the central 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 adjacent to the northwest corner of the central portion of the Land Control Areas east of Highway 3. The residence is screened on all sides within the farmstead.

Residence E is adjacent to the southern portion of the Land Control Area on the south side of 131st Street. Vegetative screening is present on the west side of the farmstead and outbuildings are present between the residence and the Land Control Area.

Residence F is adjacent to the southern portion of the Land Control Area on the west side of 180th Avenue. The residence faces south and has existing vegetative screening along the north side and partial vegetative screening along the east side of the farmstead.

Residence G is adjacent to the southern portion of the Land Control Area on the east side of 190th Avenue. The residence faces south and has existing vegetative screening along the north and west sides of the farmstead.

Residence H is adjacent to the southern portion of the Land Control Area on the north side of 131st Street. Nearest to the residence, vegetative screening is present along the north and west sides of the farmstead. An additional area of vegetative screening is present along the southern edge of the farmstead, near 131st Street.

4.2.4.1 Impacts and Mitigation

The Project will convert approximately 1,161 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. If the hybrid electrical configuration is selected, cabling 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. The above-ground cabling would not likely 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 Magnolia Substation, approximately 150 feet apart. This area already hosts two transmission lines (see Section 4.2.9 and Figure 9 – 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 Figure 3 –Preliminary Project Layout).

The solar arrays will be visible from adjacent roadways and parcels but given their relatively 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. The closest residence to preliminary design (Residence A) is approximately 132 feet immediately adjacent to the west side of the Preliminary Development Area along 180th Avenue. Elk Creek has coordinated with the owners of Residences A, B, C, D, E, F, G, and H 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 (see Appendix B). In addition, Elk Creek has negotiated with the landowner of Residence F and agreed to install vegetative screening along the west side of 180th Avenue to help screen the east facing home from easterly views of the solar facility.

A rendering of the proposed Project from 180th Avenue on the west side of the Project is provided below in Image 9.

Image 9: Visual Rendering of Elk Creek Solar Facility from 180th Avenue

Operation of the Project will require downlit security lighting at the entrance of the Project and there will be down lit, switch controlled lights at each inverter for repair purposes. Impacts on 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 and Magnolia Townships 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 (0.7 mile north), Kenneth (3.0 miles north/northwest), Luverne (4.0 miles west/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 2021 American Community Survey 5-year Estimates about Minnesota and Rock County (U.S. Census Bureau, 2021b, 2021c, and 2021d). To provide a more targeted discussion of the socioeconomic environment in the immediate Project area, and to support the environmental justice discussion in Section 4.2.5.1, information is also provided for the Census Tracts in which the Project is located (Census Tracts 5701 and 5703).

Table 4.2-5: Socioeconomic Characteristics of the Project Vicinity

U.S. Census Metric	Minnesota	Rock County	Census Tract 5701	Census Tract 5703
Total Population	5,670,472	9,718	2,371	3,216
Race and Ethnicity				
White Only, Not Hispanic or Latino (%)	78.3	92.8	92.2	92.1
Black or African American (%)	6.5	0.4	0.0	1.2
American Indian or Alaska Native (%)	0.8	0.6	2.0	0.1
Asian (%)	5.0	0.6	0.3	0.5
Native Hawaiian/Pacific Islander (%)	0.0	0.0	0.0	0.0
Hispanic or Latino (%)	5.6	3.3	3.7	3.7
Total Minority Population[1]	21.7	7.2	7.8	7.9
Total Housing Units (number)	2,420,473	4,270	1,105	1,591
Vacant Housing Units (number)	252,672	292	70	111
Per Capita Income (in 2021 Inflation Adjusted U.S. Dollars)	$41,204	$34,517	$37,641	$31,062
Persons in Poverty (percent)	9.2	9.2	9.4	13.1
Unemployment Rate (percent)	4.0	2.2	2.7	3.3

1 Total minority population is the total population minus the percentage of persons who identify as White Only, Not Hispanic or Latino.
Sources: U.S. Census Bureau, 2021b, 2021c, and 2021d.

The population of Rock County represents less than 1 percent of the total population of Minnesota. Most of the population in Rock County and Census Tracts 5701 and 5703 identifies as White alone, not Hispanic or Latino, which is also true for the State of Minnesota overall; however, the total minority population in the state is about four percent higher than in Rock County or the Census Tracts in the Project area.

Per capita incomes in Rock County and Census Tracts 5701 and 5703 are about $6,000 to $10,000 lower than the state average. The unemployment rate in Rock County and the census tracts is 0.7 to 1.3 percent lower than the state average of 4.0 percent. Although the unemployment rate in the Project vicinity is lower than the state level, the percentage of individuals living below the poverty level in Rock County and Census Tract 5701 is similar to the state average. In Census Tract 5703, the percentage of individuals living below the poverty line is about four percent higher than the state level.

According to the U.S. Census Bureau data, approximately 292 vacant housing units exist in Rock County. In the nearest metropolitan area, Sioux Falls, South Dakota, there are approximately 4,418 vacant housing units (U.S. Census Bureau, 2021d). In addition, according to the Visit Sioux Falls website, 56 hotels and motels, four bed and breakfasts, and six campgrounds are available in the greater Sioux Falls area (visitsiouxfalls.com, 2023). These residence and temporary housing statistics suggest the local area could support an influx of construction workers, if needed.

Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income in decisions related to the development, implementation, and enforcement of environmental laws, regulations, and policies (MPCA, 2023a). The MPCA developed the Understanding Environmental Justice in Minnesota online screening tool to assist with identifying areas of concern for environmental justice (MPCA, 2023b). The online tool uses demographic and economic data from the U.S. Census Bureau at the census tract level to identify environmental justice communities.

In addition, recently passed Minnesota House Bill 7[7] includes an update in Minn. Statutes § 216B.1691, Subd. 1(e) that defines an environmental justice area in Minnesota:

> "(e) "Environmental justice area" means an area in Minnesota that, based on the most recent data published by the United States Census Bureau, meets one or more of the following criteria:
> (1) 40 percent or more of the area's total population is nonwhite;
> (2) 35 percent or more of households in the area have an income that is at or below 200 percent of the federal poverty level;
> (3) 40 percent or more of residents over the age of five have limited English proficiency; or
> (4) the area is located within Indian country, as defined in United State Code, title 18, section 1151."

[7] https://www.revisor.mn.gov/bills/bill.php?f=HF7&b=house&y=2023&ssn=0

Review of the MPCA's online tool indicates that there are no areas of environmental justice concern in Census Tracts 5701 and 5703 or within five miles of the Land Control Area. As shown in Table 4.2-5, less than 30 percent of people in Census Tracts 5701 and 5703 identify as a member of a non-white minority population. The presence of an environmental justice area is not indicated by the percentage of the non-white minority groups in either census tract.

In both census tracts, MPCA's online tool shows that about 25 percent of the population reported income of less than 185 percent of the federal poverty level (MPCA, 2023b). The U.S. Department of Health and Human Services estimates that, for a two-person household, an annual income of $36,482 is equivalent to 185 percent of the federal poverty level and $39,440 is equivalent to 200 percent of the federal poverty level. For a four-person household an annual income of $55,500 is equivalent to 185 percent of the federal poverty level and $60,000 is equivalent to 200 percent of the federal poverty level (U.S. Department of Health and Human Services, 2023). Data from the Minnesota Department of Health[8] estimates that 24.8 percent of the population of Rock County falls below the 200% poverty threshold. Therefore, environmental justice areas are not present in Census Tracts 5701 and 5703 based on income considerations.

According to the MPCA's online tool, non-English speaking populations are not present in Census Tracts 5701 and 5703. The nearest non-English speaking populations to the Project area are located in Worthington, which is approximately 23 miles east of the Project area. No federally recognized Indian Tribes or reservation lands are present in Rock County or the census tracts in the Project area. Therefore, environmental justice areas are not present based on consideration of English proficiency or the presence of federally recognized Indian Tribes.

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 $32,000 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

[8] https://data.web.health.state.mn.us/population_query

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 up to six 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, as proposed in this Application, will provide additional production tax payments to Rock County beyond what was presented in the 2019 Site Permit Application. Production tax payments to Rock County are estimated to total approximately $7.94M annually over 25 years. Additionally, Vienna and Magnolia Townships will receive approximately $1.985M 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.

No environmental justice areas are present within or within five miles of the Land Control Area based on review of the MPCA's Understanding Environmental Justice in Minnesota online screening tool and U.S. Census Bureau data. As the Project would not impact environmental justice communities, no mitigation measures specific to these communities are proposed.

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 (2021a), the majority of the population in Rock County identifies as White only, not Hispanic or Latino 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, 2023; Rockcountyfair.com, 2023).

4.2.6.1 Impacts and Mitigation

The Project would not impact public participation in the regional community cultural events noted above, because it is located outside of municipal areas. Therefore, no impacts on 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 (see Figure 7 – 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 0.7 mile 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 mitigation measures are proposed.

4.2.8 Land Use and Zoning

4.2.8.1 Land Use

The Project is in a rural area of Rock County, and as such the primary land use in the Land Control Area is agricultural (96.1 percent) (see Table 4.2-6 and Figure 8 - Land Use) (USGS, 2011). The remainder of the Land Control Area consists of developed land (3.2 percent) and a small amount of forested land (0.2 percent) and shrubland (0.5 percent). Most of the agricultural land in the Land Control Area is used for row-crop agriculture, such as corn and soybeans. Developed land within the Land Control Area generally consists of public roads, including 190th Avenue, 131st Street, and 141st Street. Forested land is a category in the U.S. Geological Survey (USGS) GAP/LANDFIRE 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 (7.8 acres) of shrubland within the Land Control Area is associated with roadside ditches and a wetland area that runs roughly north-south in the southern unit of the Land Control Area. The USGS GAP/LANDFIRE data did not identify wetlands or open water within the Land Control Area. See Section 4.5.5 for more information on wetlands.

Table 4.2-6 Land Use Within the Land Control Area

Land Use Type	Land Control Area (acres / %)	2020 Land Control Area (acres / %) [1]
Agricultural	1,461.8 / 96.1%	938.4 / 96.1%
Developed	49.1 / 3.2%	33.0 / 3.4%
Forested	2.9 / 0.2%	2.9 / 0.3%
Shrubland	7.8 / 0.5%^	1.6 / 0.2%
Total	**1,521.5 / 100%**	**975.9 / 100%**

Table 4.2-6 Land Use Within the Land Control Area		
Land Use Type	**Land Control Area (acres / %)**	**2020 Land Control Area (acres / %) [1]**

1 The 2020 Land Control Area information is provided for reference purposes only and reflects what was approved in the 2020 Site Permit.
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 eight 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

Rock County zoning data shows that the Land Control Area is zoned as general agricultural (Rock County Planning and Zoning, 2023). As noted in Section 7 of the Rock County Renewable Energy Ordinance, as amended June 29, 2020 (Renewable Energy Ordinance), development of large solar energy systems within the general agricultural district is a conditionally permitted use (Rock County, 2020). The 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, 2020), 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 3, part 2B) and power and communication lines ("…shall be buried underground"; Section 10, subdivision 2, part 5). As outlined throughout this Application, Elk Creek is evaluating below-ground and hybrid above-ground/below-ground electrical systems. A hybrid above-ground/belowground system has 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. 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, as described in Elk Creek's 2019 Site Permit Application. Elk Creek and Rock County entered into a Development Agreement to document how the County and Elk Creek would work together during construction of the Project. Magnolia and Vienna Townships ratified the Development Agreement through resolutions dated November 10, 2020 and July 14, 2020, respectively. Elk Creek will work with the County and Townships to update the Development Agreement and resolutions to reflect the updated Project. Rock County continues to support the Elk Creek Solar Project and a letter of support is provided in Appendix A.

4.2.8.3 Land Use and Zoning Impacts and Mitigation

Impacts on land use and zoning from construction and operation of the Project as proposed in this Application would be similar to those contained within the record at the time of the 2020 Site Permit approval.

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 Preliminary Development Area would predominately affect agricultural land (98.5 percent) and impacts to developed and shrubland land would total 1.5 percent. While developed land is present within the Preliminary Development Area, Elk Creek will not impact developed land. Solar facilities will be setback from roads that bisect the Preliminary Development Area (25 feet from the road right-of-way). Electrical cables that connect the three main units of panels will be directionally bored under or spanned over county roads. No forested areas are present within the Preliminary Development Area (see Table 4.2-7). Elk Creek has designed the solar facility to limit tree clearing to two isolated trees located in the southern unit.

Table 4.2-7 Land Use Impacts

Land Use Type	Preliminary Development Area (acres / %)	2020 Preliminary Development Area (acres / %) [1]
Agricultural	1,144.6 / 98.5%	670.1 / 98.4%
Developed	16.1 / 1.4%	10.6 / 1.5%
Forested	0.0 / 0.0%	0.0 / 0.0%
Shrubland	0.6 / 0.1%	0.6 / <0.1%
Total	**1,161.3 / 100%**	**681.2 / 100%**

1 The 2020 Preliminary Development Area information is provided for reference purposes only and reflects what was approved in the 2020 Site Permit.

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 93 percent (approximately 287,871 acres) are actively cultivated. Conversion of 1,161.3 acres of agricultural land for operation of a 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 coordinated with MDA for development of the AIMP that was approved in the 2020 Site Permit. Elk Creek updated the Project's AIMP to address potential agricultural impacts from the expanded 2023 Land Control and Preliminary Development Areas (see Appendix C). The 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 12, 2023, to

discuss the AIMP's contents and site-specific characteristics. The AIMP was provided to MDA for review and on May 25, 2023, MDA responded and approved the AIMP for the Elk Creek Solar Project as attached as Appendix C. MDA noted that changes to the environmental monitoring section of the AIMP may be appropriate, depending on how the Commission approaches Elk Creek's site permit request (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, 2020). 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 a revised Development Agreement and potential permits for the Project.

4.2.9 Public Services and Infrastructure

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. Approximately 20 telephone service providers and 15 broadband providers operate in Rock County (MPUC, n.d.; MN DEED, 2022).

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 9 – Existing Infrastructure and AADT. There are no pipelines in the Land Control Area (National Pipeline Mapping System, 2023).

Transportation

The major roadway in the area is Interstate 90, approximately 1.5 miles south of the Land Control Area. Other than CSAH 3 which forms the eastern boundary of the Project, roads that surround or dissect 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 121st Street, and bisected by 131st and 141st Streets. 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 from Minnesota Department of Transportation's (MNDOT's) Traffic Mapping Application are provided for roads in the Project vicinity in Table 4.2-8 and displayed on Figure 9 – 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 1.5 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 a total of 10 access points to the Project: the northern unit of the Project will be accessed from 180th Avenue; the central unit of the Project will have two access points from CSAH 3 and two access points from 190th Avenue; and the southern unit of the Project will have two access points from 131st Street, one from 180th Avenue, and one from 121st Street. There will also be an access to the Project substation from 190th Avenue.

There are no railroads within one mile of the Land Control Area. There is an Ellis & Eastern regional railway approximately 1.1 miles south of the Land Control Area that runs east-west between CASH 4 and Interstate 90, connecting several towns (MNDOT, 2023a).

The nearest Federal Aviation Administration (FAA)-registered airport to the Elk Creek Solar Project is the Quentin Aanenson Field Airport located approximately 2.0 miles south of Luverne and 5.6 miles southwest of the Project. This airport operates one asphalt runway and is used primarily for transient and local general aviation (AirNav, 2023).

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 9 (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 75-100 pickup trucks, cars, and/or other types of employee vehicles onsite for the majority of construction. It is estimated that approximately 10-20 semi-trucks per day will be used for delivery of facility components. Semi-truck delivery will vary per day depending on time of construction and delivery timeline of equipment. Overweight or oversized loads are unlikely. If they are required, 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 (see 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 April of 2023. On May 19, 2023, the FAA provided Determinations of No Hazard to air navigation for each of the thirty-six 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) 2017 Census of Agriculture, of the 309,120 acres that comprise Rock County, 287,871 acres (93 percent) are actively cultivated farmland. A total of 701 individual farms are located in Rock County, with the average farm size at 411 acres. The top crops (in acres) cultivated in Rock County include corn, soybeans, and foraging crops (hay and haylage, grass silage, and greenchop). Cattle tops the list of livestock

inventory in Rock County, followed by hogs and pigs, poultry (layers), and sheep and lambs (USDA, 2017).

The market value of agricultural production in Rock County in 2017 was approximately $419 million. Livestock, poultry, and their products accounted for approximately 66 percent of the total value of agricultural production, while crop sales accounted for the remaining 34 percent (USDA, 2017).

Prime farmland is discussed in Section 4.5.3.

4.3.1.1 Impacts and Mitigation

The Project will impact approximately 1,161 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 percent of the agricultural land in Rock County (287,871 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 a majority of the Land Control Area and will continue to coordinate for mapping on remaining parcels. 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. If damage occurs to drain tile or private ditches as a result of construction activities or operation of the Project, Elk Creek will repair any damages. More detail on drain tile identification, design considerations, construction measures, and operational measures is included in the AIMP (see Appendix C).

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 northeast ¼ of Section 35) that is not currently anticipated to be impacted by the Project (see Figure 8).

4.3.2.1 Impacts and Mitigation

Impacts on forestry operations from construction and operation of the Project are not anticipated. As none of the trees in the Land Control Area are considered forestry resources, 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, 2023).

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 on tourism are anticipated and therefore no mitigative measures are proposed.

4.3.4 Mining

Based on MNDOTs Aggregate Source Information System (ASIS) and County Pit Map for Rock County, there are no gravel pits in the Land Control Area (MNDOT, 2023b; MNDOT, 2003). In the ASIS data and on the Rock County Pit Map, two gravel pits are shown between 2.4- and 3.3-miles west of the Land Control Area, near the City of Luverne, and another gravel pit is shown about 2.0 miles northeast of the Land Control Area, near the Town of Kenneth.

4.3.4.1 Impacts and Mitigation

Impacts on mining operations from construction and operation of the Project as proposed in this Application, would not impact mining operations; therefore, no mitigative measures are proposed.

4.4 Archaeological and Historical Resources

In 2019, Area M Consulting (Area M) conducted a Phase I cultural resources inventory of the 2020 Land Control Area. The results of this inventory were described in Elk Creek's 2019 Site Permit Application along with a copy of the inventory report.[9] Area M also conducted a Phase I cultural resources inventory of a broader survey area west and south of the 2020 Land Control Area in

[9] The 2019 Phase I Archaeological Reconnaissance Report for the 2020 Land Control Area was filed on the Project docket (Docket No. IP-7009/GS-19-495) with the 2019 Site Permit Application. Available at: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult&userType=public#{407F2C6D-0000-CBA4-873B-9C705B453966}.

2019 that totaled 1,077.8 acres. The background literature reviews conducted for both areas included the area within and within one half-mile of each survey area; as such, the background literature reviews fully overlap with the additional 545 acres in the current Land Control Area as presented in this Application. However, the field inventory of the additional 1,077.8-acre area only overlaps with 466 acres of the 545 acres. The results of both surveys and correspondence with the Minnesota State Historic Preservation Office (SHPO) are described herein to document that the Project, as proposed in this Application, is not anticipated to affect cultural resources. Copies of correspondence with the SHPO are provided in Appendix A.

To fully capture the current Land Control Area, an additional Phase I cultural resources field inventory of the 545 acres not previously surveyed was conducted by Tetra Tech in May 2023. The results of this additional survey are described in this Application.

The Phase I inventories included a background literature review of documentation on file at the Minnesota 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 structures, and previous cultural resource inventories within and within one-half mile of the Project. 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 background literature reviews. No previously recorded archaeological or historic sites, historic structures, or previous cultural resources inventories were noted within or within one-half mile of the 2020 Land Control Area. One previous cultural resources inventory was identified within one-half mile of the 1,077.8-acre survey area; this previous survey does not overlap with the current Land Control Area.

Area M conducted Phase I field inventories of the entire 2020 Land Control Area and the additional 1,077.8-acre area in April and May 2019. Tetra Tech conducted a Phase I field inventory of the additional 545 acres in May 2023. The Phase I field inventories included systematic pedestrian survey along transects spaced 3 meters apart in areas where ground visibility was greater than 25 percent. No cultural resources were identified as a result of the Phase I field inventories conducted by Area M in 2019. Tetra Tech's field inventory identified one historic artifact scatter in the southern solar array unit that is recommended as not eligible for listing in the National Register of Historic Places (NRHP).

Area M submitted the Phase I inventory reports for the 2020 Land Control Area and the additional 1,1077.8-acre area to the Minnesota SHPO in June 2019. In letters dated July 3, 2019 and July 5, 2019, the Minnesota SHPO agreed 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). Copies of the Minnesota SHPO's letters are provided in Appendix A.

Tetra Tech will submit the Phase I inventory addendum report for the Addendum Land Control Area to SHPO in summer 2023.

4.4.1 Impacts and Mitigation

No archaeological or historic sites, or historic structures were identified during Phase I inventories of the Land Control Area, as proposed in this Application; therefore, the construction and operation

of the Project is unlikely to affect 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 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 is in compliance with the primary and secondary NAAQS for all criteria pollutants (EPA, 2023a).

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, 2023c).

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, 2022). Note that data from 2022 is not available at the time this Application is filed.

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

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2021	289	65	3	2	0
2020	330	30	0	0	0
2019	326	35	0	0	0
2018	333	32	0	0	0
2017	329	31	0	0	0

Source: MPCA, 2022.

Air quality has been considered good for the majority of the past five reported years in Marshall. Since 2017, the largest number of days classified as moderate or USG occurred in 2021. In that year, two days have been classified as unhealthy. No days have been classified as very unhealthy.

4.5.1.1 Impacts and Mitigation

Impacts on air quality from construction and operation of the Project as proposed in this Application would be minimal and limited to the period of construction. 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, 2021).

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, 2022). There are currently no EPA-designated SSAs in the Project vicinity (EPA, 2023b).

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, 2023) identified one domestic well associated with a former farmstead within the Land Control Area (see Figure 9 – 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 is 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 (2019b). 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 3.9 miles southwest of the Land Control Area.

4.5.2.1 Impacts and Mitigation

Impacts on geology and groundwater resources from construction and operation of the Project as proposed in this Application are not anticipated. The potential for the Project to impact these resources is limited. Due to the thickness of surficial materials (approximately 300 feet) excavation or blasting of bedrock is extremely unlikely (Minnesota Geological Survey, 2020).

Impacts on 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 on 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 – 24.0 acres [see Table 3.3-1]), 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 are located at least 132 feet from the nearest occupied residence (Residence A), 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 Land Control Area were assessed using the Soil Survey Geographic database (SSURGO) (Soil Survey Staff, 2023). 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, 2023). Table 4.5-2 lists the soil types located within the Land Control Area.

Approximately 28 percent of the Land Control Area is underlain by hydric soils or soils containing hydric inclusions, indicating few, if any, wetlands are likely to be present as one of many wetland characteristics is hydric soil (see Section 4.5.5). All soils in the Land Control Area have low to moderate susceptibility to erosion by water (i.e., K-factors from 0.1 to 0.4). All soils in the Land Control Area are in Wind Erodibility Group (WEG) 3, 4, 4L or 6. WEG 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, 2023).

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 in the Land Control Area are prone to compaction and rutting (see Appendix C – AIMP).

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

Map Unit Symbol	Soil Name	Land Control (acres / %)	2020 Land Control [1] (acres / %)	Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group
P48A	Allendorf silty clay loam, 0 to 2 percent slopes	9.1 / 0.60%	0.2 / 0.02%	All areas are prime farmland	No	.24	6
P48B	Allendorf silty clay loam, 2 to 6 percent slopes	30.3 / 1.99%	--	All areas are prime farmland	No	.24	6
P12B	Everly silty clay loam, 2 to 6 percent slopes	26.8 / 1.76%	26.4 / 2.70%	All areas are prime farmland	No	.28	6
P12C2	Everly silty clay loam, 6 to 12 percent slopes, eroded	4.0 / 0.26%	--	Farmland of statewide importance	No	.32	6
P14B	Flandreau silt loam, 2 to 6 percent slopes	87.1 / 5.72%	78.0 / 7.99%	All areas are prime farmland	No	.32	6
P15B	Galva silty clay loam, 2 to 5 percent slopes	17.3 / 1.14%	17.3 / 1.77%	All areas are prime farmland	No	.24	6
P16A	Graceville silty clay loam, 0 to 2 percent slopes	52.1 / 3.42%	--	All areas are prime farmland	No	.28	6
1015A	Havelock clay loam, 0 to 2 percent slopes, frequently flooded	72.1 / 4.74%	--	Not prime farmland	Yes	.24	4L
1024A	Havelock clay loam, 0 to 2 percent slopes, occasionally flooded	17.9 / 1.18%	--	Prime farmland if protected from flooding or not frequently flooded during the growing season	Yes	.24	4L
P55A	Kato silty clay loam, 0 to 2 percent slopes	9.7 / 0.64%	9.6 / 0.99%	Prime farmland if drained	Yes	.32	6
P21A	Marcus silty clay loam, 0 to 2 percent slopes	118.9 / 7.82%	49.2 / 5.04%	Prime farmland if drained	Yes	.28	4
P27A	Primghar silty clay loam, 1 to 3 percent slopes	305.0 / 20.05%	221.6 / 22.71%	All areas are prime farmland	No	.32	6
P28A	Ransom silty clay loam, 1 to 3 percent slopes	56.6 / 3.72%	29.8 / 3.06%	All areas are prime farmland	No	.32	6
P29A	Rushmore silty clay loam, 0 to 2 percent slopes	54.9 / 3.61%	54.7 / 5.61%	Prime farmland if drained	Yes	.32	6

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

Map Unit Symbol	Soil Name	Land Control (acres / %)	2020 Land Control [1] (acres / %)	Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group
P30B	Sac silty clay loam, loam substratum, 2 to 5 percent slopes	471.7 / 31.00%	333.6 / 34.18%	All areas are prime farmland	No	.32	6
P31A	Spicer silty clay loam, 0 to 2 percent slopes	6.0 / 0.40%	6.0 / 0.62%	Prime farmland if drained	Yes	.32	4L
P38B	Thurman sandy loam, 2 to 6 percent slopes	9.2 / 0.61%	9.2 / 0.95%	Farmland of statewide importance	No	.20	3
P42A	Whitewood silty clay loam, 0 to 2 percent slopes	152.7 / 10.04%	120.0 / 12.29%	Prime farmland if drained	Yes	.32	6
P43A	Wilmonton silty clay loam, 1 to 3 percent slopes	20.3 / 1.33%	20.3 / 2.08%	All areas are prime farmland	No	.28	6
	Total	**1,521.5 / 100.00%**	**975.9 / 100%**				

1 The 2020 Land Control Area information is provided for reference purposes only and reflects what was approved in the 2020 Site Permit.
Source: Soil Survey Staff, 2023.

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, 2023).

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 Land Control Area. Figure 10 (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 (see Appendix C).

Approximately 49.8 percent 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. The northeastern corner 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 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 as described in Section 3.1.2.2. From a soils perspective, the hybrid collection system will have fewer soil impacts than the below-ground system due to the reduced volume of trenching necessary. 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 Broberg highlights the utility and specific benefits of using native plants on solar sites (Broberg, 2016).

> *"[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 and pesticide and fertilizer application. And, over time, native

plants out-compete weeds allowing ground cover to be maintained with just a single annual mow, reducing operating costs."

With the proper implementation of environmental protection measures intended to prevent, minimize, and/or reclaim soil erosion effects, no unmitigated loss of soil will result from the Project. Additionally, taking 1,161.3 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 (24.0 acres). Seed mixes are discussed in more detail in Section 4.5.6.

Prime Farmland

As shown in Table 4.5-3, 98.8 percent of the soils within the Preliminary Development Area are classified as prime farmland, prime farmland if a limiting factor is mitigated or farmland of statewide importance; however, it is important to note that the prime farmland designation is independent of current land use (USDA NRCS, 2023).

Table 4.5-3 Farmland Classifications within the Preliminary Development Area

Farmland Classification	Preliminary Development Area (acres / %)	2020 Preliminary Development Area (acres / %) [1]
Prime Farmland	885.0 / 76.21%	554.9 / 81.4%
Prime Farmland if Drained	256.6 / 22.09%	126.3 / 18.6%
Prime farmland if protected from flooding or not frequently flooded during the growing season	2.7 / 0.23%	--
Farmland of Statewide Importance	3.6 / 0.31%	--
Not Prime Farmland	13.5 / 1.16%	--
TOTAL	**1,161.3 / 100.00%**	**681.2 / 100%**

1 The 2020 Preliminary Development Area information is provided for reference purposes only and reflects what was approved in the 2020 Site Permit.
Source: Soil Survey Staff, 2023.

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 2.3.4, 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 Project is in the Big Sioux Watershed Basin (MNDNR, n.d.(a)). Based on desktop resources, there are seven NHD flowlines within the Land Control Area (four in northwest unit, one in the central unit, and two in the southwest unit; see Figure 11 – Water Resources). A field survey was conducted to verify the desktop information and identify and characterize waterbodies for the entire Land Control Area in April 27-28, 2023. The 2023 field survey confirmed that there are two streams and no open water features (e.g., lakes or ponds) within the Land Control Area. The five remaining NHD flow lines are no longer present. The two identified waterbodies are located in the southern unit of the Land Control Area. The first waterbody is in the southwest corner and is an intermittent channel that is mapped as two segments separated by a 185-foot wetland segment. The second waterbody is a perennial waterbody in the eastern portion of the southern unit and extends from the southern boundary to the northern boundary.

Both waterbodies are unnamed streams that extend off-site to the south and connect to Elk Creek, an MDNR Public Water watercourse. Neither of the identified waterbodies are listed as MNDNR Public Waters Inventory (PWI) watercourses (see Figure 11 – 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 50 feet south of the Land Control Area (separated from the Land Control Area by 121st Street). Both Champepadan Creek and Elk Creek are listed by MPCA as impaired waters.

The digital flood hazard layer for the Project area is not available in Federal Emergency Management Agency (FEMA) National Flood Hazard Layer (NFHL) Viewer. However, based on the FEMA 1977 Flood Insurance Rate Map (FIRM) panel paper map (FIRM Panel 270642B) for the Project area, the southeast corner of the Land Control Area (approximately 20.6 acres) intersects a designated flood hazard area (Zone A) associated with Elk Creek. In addition, a review of FEMA's Flood Map Changes Viewer, which shows preliminary new FEMA digital FIRMs (i.e., many paper map counties have preliminary or pending new maps), illustrates the presence of flood zone A in the Land Control Area; however, the Preliminary Development Area does not intersect the floodplain (see Figure 11 - Water Resources).

4.5.4.1 Impacts and Mitigation

The Project has been designed to minimize impacts to drainageways within the Land Control Area. Solar panels will not be sited in these drainage ways and underground collection lines will be drilled underneath these features to avoid direct impacts. 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 28 stormwater drainage basins within existing low-lying areas to help control runoff during rain events.

Elk Creek will coordinate with Rock County regarding the official location of the floodplain boundary and for any requirements associated with this area. In addition, because the Project is within one mile of impaired waters, Elk Creek will submit the SWPPP to MPCA for review and

approval prior to construction and obtaining coverage under the General Construction Stormwater Permit.

4.5.5 Wetlands

Wetlands are valuable for surface and subsurface water storage, nutrient cycling, retention of sedimentation, and plant and animal habitats. As included within the record at the time of the 2020 Site Permit approval, potential wetlands within the 2020 Land Control Area were determined by reviewing desktop resources (i.e., National Wetlands Inventory [NWI] data, aerial photography, hydric soils map unites, LiDAR, and digital elevation models) followed by formal wetland delineations conducted in May 2019. [10] An updated wetland delineation was conducted for the entire Land Control Area in April 2023.

The 2019 wetland delineation identified one palustrine emergent (PEM) wetland (0.2 acres) within the 2020 Land Control Area. The wetland was located within the southeast portion of the 2020 Land Control Area. The 2019 delineation also confirmed the absence of two NWI-mapped wetlands in the northwest portion of the 2020 Land Control Area. The Rock County Technical Evaluation Panel (TEP) reviewed and concurred with the findings of the 2019 wetland delineation (see Appendix A).

The 2023 wetland delineation identified six palustrine emergent (PEM) wetland areas within the Land Control Area (Figure 11). One wetland (3.38 acres) is adjacent to a delineated intermittent stream and located within the southwest corner of the Land Control Area. The second wetland (0.36 acres) is within a narrow agricultural swale located in the south-central portion of the Land Control Area. The third wetland (16.56 acres) is adjacent to a delineated perennial stream and extends north from the southeast corner of the Land Control Area to a roadside ditch along the northern boundary of the southern unit of the Land Control Area. The fourth wetland (0.05 acres) occupies a roadside ditch and is located in the northeast corner of the southern unit of the Land Control Area. The fifth wetland (0.40 acres) occupies a narrow north-south roadside ditch located along the western boundary of the central unit of the Land Control Area. The sixth wetland (1.92 acres) occupies a natural grassland buffer between two cropped fields and is located within the central portion of the Land Control Area. This wetland is an expansion of the wetland that was delineated within the 2020 Land Control Area.

Table 4.5-4 shows a comparison of the wetlands delineated within the 2020 Land Control Area with those delineated in the Land Control Area.

Table 4.5-4 Wetlands within the Land Control Area

Land Control Area	Documented Wetlands by Cowardin Community					
	PEM		PSS		PFO	
	Count	Acreage	Count	Acreage	Count	Acreage
Land Control Area	5	22.7	0	0	0	0

[10] The 2019 Wetland Delineation Report for the 2020 Land Control Area was filed on the Project docket (Docket No. IP-7009/GS-19-495) with the 2019 Site Permit Application. Available at: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult&userType=public#{507F2C6D-0000-C928-B55D-6BE701E362C2}.

Table 4.5-4 Wetlands within the Land Control Area						
	Documented Wetlands by Cowardin Community					
	PEM		PSS		PFO	
Land Control Area	Count	Acreage	Count	Acreage	Count	Acreage
2020 Land Control Area [1]	*1*	*0.2*	*0*	*0*	*0*	*0*
1 The 2020 Land Control Area information is provided for reference purposes only and reflects what was approved in the 2020 Site Permit.						

4.5.5.1 Impacts and Mitigation

Access roads will impact approximately 0.03 acre of delineated wetlands. In addition, approximately 45 feet of fence intersects delineated wetland; however, impacts would be limited to the location of fence posts in the wetland, which would be minimized to the extent possible. Any collection lines crossing wetland areas would be installed via drill. 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 (see Appendix C). Impacts to wetlands are not expected to affect surface water drainage or off-site wetlands.

4.5.6 Vegetation

The Elk Creek Solar Project is in the Inner Coteau Subsection of the Prairie Parkland Province (MNDNR, n.d.(b)). 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.

Based on the USGS GAP/LANDFIRE 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 and two isolated trees located in the southern unit. In addition, based on the wetland delineation discussed in Section 4.5.5, there are six PEM wetlands 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 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 (1,144.6 acres). Agricultural land within the Preliminary Development Area will be converted to open, herbaceous cover (i.e., within the racking area) 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 (24.0 acres). According to the USGS GAP data, about 0.6 acre of shrubland is present within the Preliminary Development Area; however, based on a

review of aerial imagery, it does not appear that any shrubland will be impacted by the Preliminary Development Area. If present, shrubland will also be converted to open, herbaceous cover for the life of the Project (estimated at 30 years). Additionally, Elk Creek has designed the Project to minimize tree clearing, as only the two isolated trees within the southern unit will be removed.

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 four seed mixes, is included as an appendix to the AIMP 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, 2021). The USFWS identified 25 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 that were also identified in the Project-specific USFWS Information for Planning and Conservation (IPaC) report for the Project include the bald eagle (*Halieetus leucocephalus*), American bittern (*Botaurus lentiginosus*), black rail (*Botaurus lentiginosus*), upland sandpiper (*Bartramia longicauda*), red-headed woodpecker (*Melanerpes erythrocephalus*), bobolink (*Dolichonyx oryzivorus*), and lesser yellowlegs (*Tringa flavipes*) (USFWS, 2021; USFWS, 2023a).

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, n.d.(a); USFWS, 2007). The MBTA protects migratory birds and most resident birds that are native to the U.S. from take (including killing, capturing, selling, trading, and transport). 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, 2007). Unlike the MBTA, BGEPA prohibits disturbance that may lead to biologically significant impacts, such as interference with feeding, sheltering, roosting, and breeding or abandonment of a nest (USFWS, 2007).

Land uses in the Land Control Area are primarily agricultural (96.1 percent), with some small amounts of developed areas (3.2 percent), forested land (0.2 percent), and shrubland (0.5 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 and red-headed woodpecker. The Land Control Area also has very little open water (see Section 4.5.4) and wetlands (see Section 4.5.5). Thus, few wetland- or water-dependent birds 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 99.3 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, n.d.(c)). 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 24.0 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, 1,137.3 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 IPaC website (USFWS, 2023a) for the federal endangered, threatened, candidate, and proposed species; and designated critical habitat that may occur within the Project boundary in Rock County, Minnesota (see Table 4.5-4).

The MNDNR's Natural Heritage Information System (NHIS) was also reviewed for documented occurrences of federally listed species and state-listed species within one mile of the Project Area (see Table 4.5-4) (MNDNR, 2022). The MNDNR maintains the NHIS database through their Natural Heritage Program and Nongame Game Research Program; the NHIS is the most complete source of data on Minnesota's rare, endangered, or otherwise significant plant and animal species, plant communities, and other rare natural features. Although these reviews do not represent a comprehensive survey, they provide information on the potential presence of rare and unique species and habitats. The NHIS information provided here is based on a query of licensed NHIS data (per MNDNR license agreement; MNDNR, 2022). In addition, Elk Creek submitted a Natural Heritage Review Request to the MNDNR via the MNDNR's Minnesota Conservation Explorer (MCE) online tool on April 24, 2023; a response from the MNDNR was received on July 5, 2023 and is summarized below.

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, 2022a)	No	No	SC	E
Tricolored bat [d]	*Perimyotis subflavus*	Forests and woodlots where they roost in live and dead leaf clusters (USFWS, 2023b)	No	No	SC	PE
Fish						
Topeka Shiner	*Notropis topeka*	Small prairie streams (MNDNR, n.d.(d))	Yes	No	SC	E & CH

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]
Plains Topminnow	*Fundulus sciadicus*	Backwaters and pools of creeks and rivers with aquatic plants and a rocky or sandy bottom (MNDNR, n.d.(e))	Yes	No	T	None
Insects						
Monarch Butterfly [d]	*Danaus plexippus*	Fields and parks where milkweed and native plants are common (MNDNR, n.d.(f)	No	No	N/A	C
Plants						
Western Prairie Fringed Orchid [d]	*Platanthera praeclara*	Moist tallgrass prairies and sedge meadows (USFWS, n.d.(b).	No	No	E	T

[a] E = Endangered, T = Threatened, PE = Proposed Endangered, C = Candidate, SC = Special Concern, CH = Critical Habitat
[b] MNDNR, 2013; MNDNR, 2022
[c] USFWS, 2023a
[d] Elk Creek's review of the NHIS did not indicate any records of the NLEB or western prairie fringed orchid within a mile of the Land Control Area or within the Land Control Area; however, review of the USFWS' IPaC indicated that these two species have the potential to occur in the Land Control Area. In addition, the federally proposed tricolored bat and candidate monarch butterfly were also identified in the IPaC review for the Land Control Area. The federally listed prairie bush clover, which was a species included in the 2019 Site Permit Application, is no longer identified as a species of concern for the Land Control Area.

4.5.8.1 Federal Listed Species

According to Elk Creek's review of the USFWS IPaC, there are three species that are listed as threatened or endangered under the federal Endangered Species Act (ESA) (northern long-eared bat [NLEB], Topeka shiner, and western prairie fringed orchid), one species proposed for listing as endangered (tricolored bat), and one candidate species (monarch butterfly) that may be present within the Land Control Area in Rock County, Minnesota. In addition to these five federally listed, proposed, and candidate species, there is designated critical habitat for the Topeka shiner in Rock County (USFWS, 2004), located just outside the Land Control Area.

Northern Long-eared Bat

The NLEB 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. In the Project area, hibernation generally occurs in caves and mines between October 1 and April 15 (USFWS, 2023c). In April, the species emerges from its hibernacula and moves to summer habitat. The NLEB has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles, with diet composition differing geographically and seasonally. (USFWS, 2022a). 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). Most foraging occurs above the understory, 3 to 10 feet above the ground, but under the canopy on forested hillsides and ridges, rather than along riparian areas. Foraging also takes place over small forest clearings and water, and along roads (USFWS, 2022a). USFWS defines suitable forested/wooded habitat as containing potential roosts (*i.e.,* live trees or snags greater or equal to 3 inches in diameter at breast height that have exfoliating bark, cracks, crevices, or cavities), as well as forested linear features such as wooded fencerows, riparian forests, and other wooded corridors. Individual trees may be suitable habitat when they exhibit characteristics of potential roost trees and are within 1,000 feet of other forested/wooded habitat (USFWS, 2022b). The NLEB is currently declining due to a disease that affects hibernating bats called white-nose syndrome (WNS).

The NLEB was listed as threatened under the ESA in 2015 (80 Federal Register [FR] 17974), and a special rule pursuant to section 4(d) of the ESA was finalized in 2016 (81 FR 1900) (4(d) Rule). The 4(d) Rule limited the species' take prohibitions for energy projects not involving wind facilities to tree removal near hibernacula and maternity roost trees and activity within hibernacula. The USFWS provided a framework for streamlined Section 7 consultation for federal actions consistent with the 4(d) Rule that may affect the NLEB but would not result in prohibited take. The USFWS completed its intra-agency consultation and issued a non-jeopardy programmatic biological opinion (2016 PBO) for both the 4(d) Rule and implementation of the streamlined framework. Federal agencies could rely upon the finding of the 2016 PBO to fulfill their project-specific Section 7(a)(2) responsibilities.

The 4(d) Rule and 2016 PBO were rendered obsolete on March 31, 2023, when the species was reclassified to endangered (87 FR 73488, November 30, 2022; 88 FR 4908, January 26, 2023), as 4(d) Rules are only available for threatened species. All take occurring on or after March 31, 2023, is now prohibited under the ESA.

The Land Control Area is primarily agricultural lands with only a small area of forested habitat (0.2 percent); the landscape surrounding the Land Control Area is also dominated by agriculture. During their active season (April 1 through November 14), NLEB may roost in the trees within the Land Control Area.

Tricolored Bat

On September 14, 2022, the USFWS, under the U.S. Department of the Interior (DOI), published a proposed rule to the Federal Register proposing to list the tricolored bat (*Perimyotis subflavus*) as an endangered species under the ESA.

The USFWS is proposing the species for listing due to substantial declines in tricolored bat abundance across its range. The main threats to the species are the impacts of WNS, wind-energy-related mortality, the effects of climate change, and habitat loss and disturbance.

WNS has caused estimated tricolored bat population declines of 90-100 percent across 59 percent of its range, and nearly one third of the species' known hibernacula have been extirpated. Under current conditions (i.e., no increase in threats to the species), the USFWS believes by 2030, range-wide abundance would decline by 89 percent and the number of known winter colonies would decline by 91 percent.

Overall, the species requires similar habitat to other listed bat species – they utilize both live trees and snags in deciduous hardwood forested areas. In spring, summer, and fall, the species may be found roosting among leaf clusters of live or recently dead deciduous hardwood trees. The species will also roost in Spanish moss and "bony beard" lichen (*Usnea trichodea*) in the southern and northern portions of the range, respectively. In winter, tricolored bats utilize caves and mines for hibernation; however, in the southern portions of its range where caves are not as abundant, the species will often hibernate in "road-associated" culverts.

As noted above, the tricolored bat is proposed to be listed as endangered, with a final listing decision expected by fall of 2023. Proposed species do not receive federal protection through the Endangered Species Act; however, should this species become listed prior to construction of the Project, adverse impacts would be avoided as any tree clearing would be conducted during the species' inactive season.

Topeka Shiner

The Topeka Shiner (*Notropis topeka*) is restricted to small prairie streams that are tributary to the Missouri River in Lincoln, Murray, Nobles, Pipestone, and Rock counties in southwestern Minnesota (MNDNR, n.d.(d)). 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. The species prefers pool and oxbow areas that are outside main channel courses (MNDNR, n.d.(d)).

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 located approximately 50 feet south of the southern boundary of the Land Control Area (and separated from the Land Control Area by 121st Street), 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).

Western Prairie Fringed Orchid

Western prairie fringed orchid occurs in mesic to wet tallgrass prairies and sedge meadows. In southern Minnesota, most populations are found in southern mesic prairie and occasionally southern wet prairie (MNDNR, 2020b). 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, n.d.(b)).

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.

Monarch Butterfly

On December 17, 2020, the USFWS published the result of their 12-month review of the monarch butterfly and determined that listing the species under the ESA was warranted but precluded. The species meets the criteria for listing as an endangered or threatened species, but the USFWS cannot currently implement the listing due to limited staff and/or funding and because there are other listing actions with a higher priority. The species is now a candidate for listing; however, candidate species are not protected under the ESA.

Adult monarch butterflies feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of milkweed, the sole food source for larvae. As discussed above, the Project was designed to occur primarily in cultivated cropland. The Project will also avoid woodlands, shrublands, grasslands, and water resources to the degree practicable. However, it is possible that the Project will have minor, temporary impacts to native vegetation serving as a food source to monarch butterflies; however, no long-term significant impacts to the species are anticipated. As discussed in section 3.4.4, Elk Creek, in accordance with the VMP, the site will be seeded with site specific seed mixes developed in coordination with the MNDNR and the interagency Vegetation Management Plan Working Group and include four native seed mixes.

4.5.8.2 State Listed Species

Documented occurrences of state-listed species 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. Records of two state listed species were documented within one mile of the Land Control Area—Topeka shiner, a state species of concern (also federally listed as endangered), and plains topminnow, a state threatened species. 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, n.d.(e)). No suitable creek or river habitat is 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 (Revised 2023) (Solar Guidance) that recommends identification of high value natural resources during Project development. High value resources include (1) state-listed species; (2) Minnesota Biological Survey (MBS) SOBS and MNDNR NPCs; (3) Shorelands and Floodplains; (4) PWIs; (5) Wetlands; (6) Calcareous Fens; (7) Public lands; (8) Large block and other important habitats (MNDNR, 2023c). State-listed species are discussed in Sections 4.5.8.1 and 4.5.8.2; and shorelands, floodplains, public waters, and wetlands are discussed above in Sections 4.5.4 and 4.5.5. The remaining high value natural resource areas are discussed below.

MBS Sites of Biodiversity Significance and DNR Native Plant Communities

MNDNR's 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. There is one MBS SOBS ranked moderate (Magnolia 2), which is associated with Elk Creek located directly adjacent to the southeast boundary of the Land Control Area and is separated from the Land Control Area by both 121st Street and 190th Avenue. The Land Control Area will not impact this site.

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.

Calcareous Fens

Calcareous fens are rare groundwater-fed wetlands that are sensitive to changes in water quality and quantity. Reductions in groundwater discharge or increases in surface water can cause damage to the fen community, both in terms of its condition and size. Based on review of MNDNR's data, there are no calcareous fens within 5 miles of the Land Control Area.

Native Prairie

Native prairie is defined as land that has never been plowed where native prairie vegetation originating from the site currently predominates or, if disturbed, is predominantly covered with native prairie vegetation that originated from the site. (State of Minnesota, 2022). There is no MNDNR-mapped native prairie in the Land Control Area.

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 are no MNDNR-mapped railroad prairie rights-of-way in the Land Control Area.

Public Lands

Public lands include conservation and recreation lands such as state parks, state recreation areas, state trails, state scientific and natural areas, state wilderness areas, state forests, state wild and scenic rivers, state water access sites, state wildlife management areas, aquatic management areas, state historic sites, Federal Waterfowl Production Areas and refuges, national parks, county trails and parks, other public lands, private conservation lands, as well as school trust lands (MNDNR, 2023c). There are no public conservation and recreation lands or school trust lands in the Land Control Area; public conservation and recreation lands in the Project vicinity are also discussed in Section 4.2.7.

Large Block and Other Important Habitats

Large block habitats are grassland or forest habitats of greater than 40 acres (MNDNR, 2023c). The Land Control Area is highly fragmented; 99.3 percent is used for agriculture or is developed. The Land Control Area contains no large block habitats.

4.5.8.4 Impacts and Mitigation

Federal Listed Species

Tree clearing for the Project will be limited to removal of two isolated trees in the southern unit, which are located greater than 2,000 feet from other forested habitat. As noted above in Section 4.5.8.1, individual trees that are not located within 1,000 feet of other forested/wooded habitat are not considered suitable habitat for the NLEB. Further, removal of the two isolated trees will be

conducted during the NLEB's inactive season (November 15 – March 31). Implementation of this measure would also be protective of the tricolored bat as the tricolored bat is the first among North American bats to enter hibernation and the last to emerge in late spring (USFWS, 2022c). Bats 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.

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 developed lands (3.2 percent) and forested area (0.2 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).

A field survey was conducted for the entire Land Control Area on in May 2023. As part of that effort, Elk Creek noted that areas of herbaceous vegetation within the Preliminary Development Area consist primarily of smooth brome (*Bromus inermis*), bluegrass (*Poa pratensis* and *Poa compressa*), and small amounts of crabgrass (*Digitaria sp.*) in upland areas; and reed canary grass (*Phalaris arundinacea*) and cattail (*Typha x glauca*) in wetland areas. Upland forbs observed included dandelion (*Taraxacum officinale*), clover (*Trifolium pratense* and *Trifolium arvense*), and thistle (*Cirsium arenes*); and wetland forbs included stinging nettle (*Urtica dioica*), curly dock (*Rumex crispus*), and milkweed (*Asclepias sp.*). Potential prairie habitat was not observed during the field survey.

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. Topeka shiner critical habitat is designated in Elk Creek and Champepadan Creek, which are located approximately 50 feet south 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" (which were provided by the MNDNR in comments on the 2020 Project).

The USFWS has recently developed and implemented new tools called Determination Keys (Dkeys) in IPaC that can be used to streamline the consultation process. Dkeys are logically structured sets of questions designed to assist users in determining if a project qualifies for a pre-determined consultation outcome based on existing programmatic consultations or internal

USFWS standing analyses. Each Dkey starts with a qualification interview to see if the key is appropriate for your project. There are two Dkeys available in IPaC for the Elk Creek Solar Project:

- **The Minnesota-Wisconsin Federal Endangered Species Determination Key**: a tool to help Federal agencies and project proponents decide if their proposed action has the potential to adversely affect federally listed species and designated critical habitat on certain routine and predictable projects in Minnesota and Wisconsin. This key covers the following species expected to occur in the Project area: Topeka shiner, western prairie fringed orchid, monarch butterfly, and tricolored bat.
- **Northern Long-eared Bat Rangewide Determination Key:** this key is intended to streamline review of projects for potential effects to the NLEB.

Elk Creek completed both Dkeys noted above for the Project and the resulting consistency letters are included in Appendix A and summarized in Table 4.5-5 below.

Table 4.5-5
Preliminary USFWS Determinations for Federal Species

Common Name	Status	Preliminary USFWS Determination
Northern long-eared bat (NLEB)	Endangered	Not Likely to Adversely Affect
Tricolored bat	Proposed Endangered	Not Likely to Adversely Affect
Topeka shiner	Endangered	Not Likely to Adversely Affect
Western Prairie Fringed Orchid	Threatened	No Effect
Monarch Butterfly	Candidate	No Effect

Elk Creek will review and update (if applicable) the Project in IPaC closer to construction and will coordinate further with the applicable agencies, as necessary.

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.

Elk Creek initially provided a letter notifying the MNDNR of the 80 MW project (2020 Project) on February 26, 2019 and received a response from the DNR on March 15, 2019 with preliminary review comments, including standard recommendations from the Commercial Solar Siting Guidance document. Additional coordination occurred on June 14, 2019 with guidance from MNDNR on seeding and plant species and the recommendation that the Project consider the Board of Water and Soil Resources Habitat Friendly Solar Program. Further comments were received from the MNDNR during the Project's scoping and informational meeting including the recommendation that construction of the facility take place during drier months and outlined potential risks to Topeka shiner.

Elk Creek sent a Project introduction letter to MNDNR staff for the updated Project on April 14, 2023, and May 5, 2023, and submitted a Natural Heritage Review Request via MNDNR's Minnesota Conservation Explorer site on April 24, 2023. The MNDNR responded in a letter dated July 5, 2023, and identified the Topeka shiner and plains topminnow as species that may occur in the vicinity of the Project, noting that stringent erosion and sediment control practices must be implemented and maintained near Elk Creek and any of its tributaries during construction and operation.

While the Project has expanded, the Land Control Area remains primarily agricultural. The Project will continue to avoid impacts on Topeka shiner critical habitat. Critical habitat BMPs will still be implemented and MNDNR solar siting guidance will continue to be consulted and utilized when practicable. Additionally, Elk Creek is updating the Vegetation Management Plan for the project for the Preliminary Development Area and will seek coordination and approval by the VMP Agency Working Group prior to construction.

MNDNR High Value Areas

State-listed species are discussed in Sections 4.5.8.1 and 4.5.8.2; and shorelands, floodplains, public waters, and wetlands are discussed above in Sections 4.5.4 and 4.5.5. There are no additional MNDNR High Value Areas in the Land Control Area, including MBS SOBS, NPCs; native prairie; calcareous fens; public lands; or large block habitats. As such, impacts on MNDNR High Value Areas will be minimal and no mitigative measures are proposed.

4.6 Climate Change

The effects of climate change have been tied to an increase in GHG emissions from human-related activity, including transportation, energy production, and industry (EPA, 2023c). A key element in addressing climate change is the reduction of greenhouse gas (GHG) emissions produced each year. In 2007, Minnesota passed the Next Generation Energy Act (NGEA), which set statutory goals to reduce GHG emissions by 80 percent between 2005 and 2050 (MPCA, 2023d), from 174.6 million tons per year (tpy) of carbon dioxide equivalent (CO_2e) down to 34.9 million tpy CO_2e (MPCA, 2023e). In December 2019, Governor Tim Walz signed into effect Executive Order 19-37 (EO 19-37) to establish a Climate Change Subcabinet and Governor's Advisory Council on Climate Change. The Climate Change Subcabinet is responsible for identifying policies and strategies to meet or exceed the statutory goals set in the NGEA and to identify policies and strategies to increase climate resiliency across the state (State of Minnesota, 2019). As of 2020, Minnesota is on track to meet this goal and has experienced a 23 percent reduction in GHG emissions across all industry sectors (MPCA, 2023f).

The Project will contribute to Minnesota's on-going success in reducing GHG emissions by providing a renewable source of energy as an alternative to more carbon-intensive sources of energy, such as coal and natural gas.

4.6.1 Impact of Project on Climate Change

The Project will offset a large quantity of greenhouse gas (GHG) emissions by providing renewable electricity and will increase carbon sequestration of the soil by converting

approximately 1,161 acres of predominately agricultural land to herbaceous land (see Section 4.5.6.1). However, some GHG emissions will be produced during the fabrication, construction, and operating phases of the Project. Emission calculations for the Project are included as Appendix E.

During operation, the Project is expected to produce enough renewable electricity to service 46,300 homes and to offset approximately 262,500 tons per year (tpy) carbon dioxide equivalent (CO_2e). This is equivalent to removing nearly 53,000 passenger vehicles from the road annually (EPA, 2023d). In addition, the Project will convert approximately 1,161 acres of predominately row crop agricultural land to herbaceous land. Agricultural lands and herbaceous lands can both act as carbon sinks. The carbon storage capacity of herbaceous lands is about 65 percent higher than that of agricultural lands (Walston et al, 2021).

Greenhouse gas emissions are generated throughout the life of a solar project at a rate of about 42 grams CO_2e per kilowatt hour (kWh) (g CO_2e/kWh) (IPCC, 2014). The Project is expected to generate 15,556 tpy CO_2e averaged over the 30-year project lifetime. These emissions will not be uniformly generated. Approximately 60-70 percent of these emissions occur during the upstream manufacturing and construction stage. Operational processes, including lighting, emergency generators, and maintenance activities, accounts for 21-26 percent of these emissions. The final 5-20 percent of GHG emissions are expected due to decommissioning and disposal of Project components (NREL, 2012).

Activities associated with the construction of the Project will result in GHG emissions from the combustion of diesel and gasoline in heavy construction equipment, delivery vehicles, and worker passenger vehicles. Emissions from construction activities were calculated by estimating the volume of fuel expected to be consumed by each piece of equipment and determining the GHG emissions released upon combustion of those fuel volumes. Construction activities are expected to produce a total of 2,949 tons CO_2e. GHG emissions from construction vehicles will be minimized by keeping construction equipment in good working order. Upon completion of the construction activities, emissions from heavy equipment, delivery vehicles, and construction personnel will cease.

During the operational stage, up to six permanent full-time workers will staff the solar farm and maintenance activities will require the use of one to two maintenance trucks per day. The commuter vehicles and maintenance trucks will generate a minor amount of GHG emissions. Utilities required to support operation of the solar farm include electricity, water, and sanitation. Approximately 1,350 kWh per month of electricity may be purchased from the grid if needed to meet operational needs such as lighting, cameras, and comfort heating. Approximately 17 tpy CO_2e will be generated during the operating phase of the Project.

Elk Creek Solar plans to install a private well and septic field to support operations. Approximately 600 gallons of water are expected to be used per day. This minor use of water is not expected to have a noticeable impact on the water supply. The septic system is expected to process 600 gallons per day. The septic system will be designed, installed, and maintained to withstand weather events associated with climate change, including increased heavy rains.

4.6.2 Impact of Climate Change on Project

The Minnesota Department of Natural Resources publishes historical climate data from the years 1895 to 2022. This data shows that the average temperature of Rock County, Minnesota has been increasing at a rate of 0.16°F per decade to reach an annual average temperature of 45.44°F in 2022. Over the 30-year lifespan of the Project, the annual average temperature could increase by 0.48°F. The annual precipitation has increased at a rate of 0.15 inches per decade to 27.34 inches in 2022 (MNDNR, 2023d). Over the lifespan of the Project, precipitation could increase an additional 0.45 inches per year. Additionally, the frequency and intensity of heavy rainfall is increasing across the state (MNDNR, 2023d). The MNDNR climate office has defined mega-rain events as rainfalls of more than 6 inches over 1,000 square miles in 24 hours or less. Sixteen mega-rain events have been recorded in the past 50 years. Of these, 11 events have occurred since the year 2000. Over the next 30 years, Rock County is predicted to have minor risk of flooding (Risk Factor, 2023). Rock County experienced a period of extreme drought in 2012 and 2013. Currently, the county is ranked as abnormally dry or in moderate drought (National Drought Mitigation Center, 2023). Since 2005, average wind speed at the Luverne, Minnesota airport weather station has decreased by 0.017 miles per hour per decade. However, over the same time period, the maximum peak wind gust speed has increased by 0.59 miles per hour per decade. The Project has been designed with consideration of the potential climate changes during the lifetime of the Project, including increased heavy rainfalls, stronger wind gusts, and increased temperatures.

4.6.3 Impacts and Mitigation

Greenhouse gas emissions from human-related activity are a contributing factor to climate change. The Project is a mitigative measure that will reduce the effects of climate change by offsetting GHG emissions compared to electricity production by coal or natural gas fired power plants. Additionally, the Project will increase the carbon sequestration and water management capacity of approximately 1,161 acres of land.

The Project has been designed and sited to withstand the weather events typically experienced in southwestern Minnesota, as well as the potential for increased severity of storms and periods of drought due to climate change discussed above (MPCA, 2023g, MNDNR, 2023d). In an effort to minimize impacts on the facility infrastructure and equipment, the Project location was selected to avoid areas subject to flooding and pooled water during a 100-year rain event. Permanent drainage systems and stormwater ponds are sized appropriately to store and treat precipitation from more severe storms. Additionally, perennial vegetation plantings will replace current row crop agriculture in the Project area, increasing water uptake and slowing runoff.

Southwestern Minnesota can experience a range of weather events including high winds, hail, high and low temperatures, and heavy snowfall. Solar modules and related equipment will be designed to withstand storms that are potentially stronger than normal with minimal equipment downtime. During operation, Elk Creek will use industry best practices to reduce the impact of high winds and weather events, including options such as optimized stow regimes to reduce equipment exposure and installing dampening equipment to reduce oscillation during high winds. The system will be designed so that equipment can be isolated when necessary and includes an appropriate level of redundancy to allow for maintenance, repairs, and potential replacement of equipment

damaged by storms. Lighting will be provided throughout the site to allow for adequate visibility during nighttime repairs.

Project infrastructure will be designed to comply with all applicable industry, local, and state building codes and standards. Civil and structural design will include safety factors for increased wind and snow loads, as set by the current standards. The electrical system will be designed for reliability, robustness, and compliance with the current codes and standards.

4.7 Cumulative Impacts

Cumulative impacts on the environment can occur if the impacts of one activity overlap either geographically or temporally with other activities, thereby resulting in cumulatively greater impacts on a particular area or important resource.

Review of the MNDOT District 7 planned projects did not identify any proposed projects that would be adjacent to the Elk Creek Solar Project and would overlap the proposed construction timeframe for the Project (MNDOT, 2023c). The nearest proposed MNDOT project would be a resurfacing project for Highway 75 through the City of Luverne that is currently planned for the year 2025. The City of Luverne is approximately 4.0 miles west of the Project.

Review of the Rock County Highway Department's 5-year Construction Plan did not identify any proposed projects that would be adjacent to the Elk Creek Solar Project and would overlap the proposed construction timeframe for the Project (Rock County, 2023b).

No other proposed projects have been identified through coordination with other state, county, and local agencies that would overlap geographically or temporally with the proposed Project.

No cumulative impacts are anticipated from construction or operation of the Project.

4.8 Unavoidable Impacts

Elk Creek developed the updated Project design to avoid impacts on environmental resources whenever possible. In some cases, impacts on 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 this 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 soybeans to a solar facility with herbaceous vegetation underneath and around the Preliminary Development Area.

5.0 AGENCY AND PUBLIC OUTREACH

Extensive agency outreach was conducted as part of the 2020 Site Permit process. This section describes additional outreach efforts Elk Creek has conducted in support of this Application. This engagement provided Elk Creek Solar with valuable insight into landowners' and public agency preferences regarding development of Project facilities.

Table 5.1-1 identifies agencies that were contacted through meetings or a notification letter and the date that responses were received. Copies of agency correspondence are provided in Appendix A and summaries of responses received to date are provided in Sections 5.1.1 through 5.1.3.

Table 5.1-1
Elk Creek Solar Agency Correspondence

Agency	Response Date (Type)
Federal	
U.S. Army Corps of Engineer, St. Paul District	April 14, 2023 Response
U.S. Fish and Wildlife Service – Twin Cities Ecological Services Field Office	No response to date
Federal Aviation Administration	May 19, 2023 (Final Determinations of No Hazard received)
State	
Minnesota Historical Society – State Historic Preservation Office	No response to date
Minnesota Department of Natural Resources (MNDNR)– Region 4 (Southern Region), Region Environmental Assessment Ecologist	May 11, 2023 (Request for GIS data)
MNDNR – Energy Projects, Planner's Office	June 28, 2023 (Comments)
MNDNR – Region 4 Area Wildlife Supervisor	May 12, 2023 (Layout clarification question)
MNDNR – Region 4 Regional Wildlife Manager	May 12, 2023 (Forwarded to Region Env. Assessment Ecologist)
MNDNR – Natural Heritage Review Request	April 24, 2023 (Request Submitted) July 5, 2023 (Response letter)
Minnesota Department of Agriculture – Energy and Environment Section	April 12, 2023 (Meeting)
Minnesota Department of Transportation – Office of Land Management	May 12, 2023 (Request for GIS data)
Minnesota Department of Employment & Economic Development	No response to date
Minnesota Pollution Control Agency – Brainerd Office	No response to date
County	
Rock County Board of Commissioners	March 21, 2023 (Letter of support)

Table 5.1-1 Elk Creek Solar Agency Correspondence	
Agency	**Response Date (Type)**
Rock County Economic Development Authority	March 20, 2023 (Letter of Support) April 14, 2023 (Request for Information)
Local Government Units	
City of Luverne – City Administrator	April 18, 2023 (Letter of support)
Vienna Township	No response to date
Magnolia Township	No response to date

5.1 Federal Agencies

5.1.1 U.S. Army Corps of Engineers

Elk Creek contacted the USACE St. Paul District on April 14, 2023, to provide an update on the Project. The USACE responded on April 14, 2023, noting that all future Project correspondence should be directed to the Central Inbox. A follow up email was sent to the Central Inbox on May 10, 2023. No additional response from USACE has been received to date.

5.1.2 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 in April 2023. On May 19, 2023, the FAA provided Determinations of No Hazard to air navigation for each of the thirty-six points around the Land Control Area. As such, Project facilities will not exceed obstruction standards and would not be a hazard to air navigation.

5.2 State Agencies

5.2.1 Minnesota State Historic Preservation Office

Elk Creek contacted the Minnesota SHPO on April 14, 2023, to provide an update on the Project. As discussed in Section 4.4, Elk Creek plans to submit a copy of its Phase I cultural resources inventory addendum report to the Minnesota SHPO in summer 2023.

5.2.2 Minnesota Department of Natural Resources

Elk Creek contacted the MNDNR on April 14, 2023 and May 5, 2023, to provide an update on the Project. The MNDNR Regional Environmental Assessment Ecologist (Byron) responded on May 11, 2023 to request an update on the status of the Project and to request shapefiles of the Land Control Area. Elk Creek provided an update on the Project and the requested shapefiles the same day.

The Area Wildlife Supervisor (Schuna) responded to Elk Creek's Project notification update on May 12, 2023 asking if solar panels would be installed across the waterway in Section 3; Elk Creek

responded the same day to clarify that solar panels will not be installed across the waterway in Section 3.

On May 12, 2023, the MNDNR Regional Wildlife Manager for Region 4 (Trauba) responded and requested that all further Project communications be routed through the Regional Environmental Assessment Ecologist (Byron).

On June 28, 2023, the MNDNR Energy Projects Planner (Warzecha) responded with a letter to the MPUC Consumer Affairs Office with comments on the Project indicating that a thorough evaluation of potential natural resource impacts is necessary. Elk Creek provided written responses to these comments in an electronic filing to the docket on July 12, 2023.

As noted in Section 4.5.8, Elk Creek submitted a Natural Heritage Review Request to MNDNR via the MCE online tool on April 24, 2023. A copy of the submittal is included in Appendix A. On July 5, 2023, the MNDNR responded in a letter and identified the Topeka shiner and plains topminnow as species that may occur in the vicinity of the Project, noting that stringent erosion and sediment control practices must be implemented and maintained near Elk Creek and any of its tributaries during construction and operation.

Copies of correspondence with MNDNR are provided in Appendix A.

5.2.3 Minnesota Department of Agriculture

Elk Creek had a meeting with the MDA to provide an update on the Project and the AIMP on April 12, 2023. The MDA indicated that the AIMP would likely only need minor updates from the previous version for the 80 MW project. Elk Creek submitted the AIMP to MDA for review and approval in May 2023. On May 25, 2023, the MDA responded indicating approval of the Project AIMP and provide one minor change to the plan. Elk Creek has addressed MDA's requested change (see Appendix C). MDA noted that the approach to environmental monitoring for the Project may change based on how the Commission decides to proceed with Elk Creek's site permit request. A copy of MDA's response is provided in Appendix A.

5.2.4 Minnesota Department of Transportation

Elk Creek contacted the MNDOT on April 14, 2023 and May 11, 2023, to provide an update on the Project. The MNDOT responded on May 12, 2023 and requested shapefiles to confirm whether the Project would affect MNDOT right-of-way. Elk Creek provided shapefiles to MDOT on May 23, 2023. Coordination between MNDOT and Elk Creek is ongoing.

5.3 Rock County and Local Government Units/Stakeholders

Elk Creek contacted the Rock County Board on March 13th, 2023, to provide an update on the Project. Elk Creek also contacted landowners within a half mile of the Land Control Area in addition to LGUs.

5.3.1 Rock County

Elk Creek executed a Development Agreement with Rock County in September 2021 for the 80 MW project that received a Site Permit in 2020. The agreement includes development standards such as road use and repair and outlines additional construction-related permits required for construction. Elk Creek contacted Rock County on April 14, 2023, to provide an update on the Project. Rock County responded the same day asking for an update on the total investment of the Project. Elk Creek responded on April 20, 2023 and provided the requested information. Elk Creek will work with Rock County to update the Development Agreement prior to construction.

On March 21, 2023, the Rock County Board of Commissioners provided a letter of support for the Project. On March 20, 2023, the Rock County Economic Development Authority provided a letter of support for the Project. Copies of these letters are provided in Appendix A.

5.3.2 Magnolia and Vienna Townships

In 2020, Magnolia and Vienna Townships executed Resolutions that approved the Rock County Engineer to act on its behalf and negotiate/execute a final Development Agreement with Elk Creek Solar, and to make the final determination that the provisions of the agreement have been met. As stated above, Elk Creek executed a Development Agreement with Rock County in September 2021 for the 80 MW project. Elk Creek contacted Magnolia and Vienna Townships on May 10, 2023, to provide an update on the Project. Elk Creek will seek updated Resolutions from the townships to be incorporated into a revised agreement.

5.3.3 City of Luverne

Elk Creek contacted the City of Luverne on March 13, 2023, to provide an update on the Project. The City of Luverne indicated they are supportive of the Project in a letter dated April 18, 2023. A copy of the letter is provided in Appendix A.

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