Environmental Assessment:

Plummer Solar Project

The Human and Environmental Impacts of Constructing and Operating the

130 MW Plummer Solar Project

October 2024

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COMMERCE DEPARTMENT

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Enbridge Solar (Plummer), LLC (Plummer Solar) proposes to construct, own, and operate a 130 megawatt solar energy generating system and associated facilities in Red Lake County, Minnesota. Plummer Solar must obtain a site permit from the Minnesota Public Utilities Commission before it can construct the proposed Plummer Solar Project.

Sources

Much of the information used to prepare this environmental assessment comes from the site permit application. Additional sources include information from relevant federal and state environmental review documents for similar projects, spatial data and site visits.

Project Mailing List

To place your name on the project mailing list contact docketing.puc@state.mn.us or (651) 201-2246 and provide the docket number (22-451), your name, email address, and mailing address. Please indicate whether you would like to receive notices by email or U.S. mail.

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Acronyms and Abbreviations

Acronym/Abbreviation	Description
AC	alternating current
AIMP	Agricultural Impact Mitigation Plan
ALJ	administrative law judge
applicant	Enbridge (Plummer) Solar
BMP	best management practice
BWSR	Board of Water and Soil Resources
Commerce	Department of Commerce
Commission	Public Utilities Commission
CSW Permit	Construction Stormwater Permit
dBA	A-weighted sound level recorded in units of decibels
DC	direct current
DNR	Department of Natural Resources
DSP	draft site permit
EA	environmental assessment
EJ	Environmental justice
EMF	electromagnetic fields
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GHG	Greenhouse gas
kV	kilovolt
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MW	megawatt
MWh	megawatt hour
mG	milligauss
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MWI	Minnesota Well Index
NAC	noise area classification
NHIS	Natural Heritage Information System
NLEB	Northern Long Eared Bat
NWI	National Wetland Inventory
project	Plummer Solar Project
PV	photovoltaic
PWI	Public Waters Inventory
ROI	region of influence
ROW	right-of-way
SCADA	supervisory control and data acquisition
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan

TCLP	Toxicity Characteristic Leaching Procedure
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VMP	Vegetation Management Plan
WCA	Wetland Conservation Act
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area

DEFINITIONS

Several terms used in this document have specific meaning in Minnesota law or regulation. Other terms are defined for clarity.

associated facilities means buildings, equipment, and other physical structures that are necessary to the operation of a large electric power generating plant or high voltage transmission line (Minnesota Rule 7850.1000, subpart 3).

construction means any clearing of land, excavation, or other action that would adversely affect the natural environment of the site or route but does not include changes needed for temporary use of sites or routes for nonutility purposes, or uses in securing survey or geological data, including necessary borings to ascertain foundation conditions (Minnesota Statute 216E.01, subdivision 3).

distribution line means power lines that operate below 69 kilovolts.

easement means… A grant of one or more of the property rights by the property owner to and /or for the use by the public, a corporation, or another person or entity

high voltage transmission line means a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length (Minnesota Statute 216E.01, subdivision 4).

land control area means the 855-acre area for which Plummer Solar is assumed to have site control through ownership, a lease agreement, or an easement. The site permit application refers to this as the "Project Area." For this document, it applies to the area for the solar facility as well as area for collection corridors, substation and transmission lines. The term is used to bound a review area and should not be understood to imply the applicant has secured, or will definitely secure, the necessary land rights.

large electric power generating plant means electric power generating equipment and associated facilities designed for or capable of operation at a capacity of 50,000 kilowatts or more (Minnesota Statute 216E.01, subdivision 5).

local vicinity means 1,600 feet from the land control area and collection line corridor.

mitigation means to avoid, minimize, correct, or compensate for a potential impact.

power line means a distribution, transmission, or high voltage transmission line.

preliminary development area means the 797-acre area within the land control area where Plummer Solar proposes to build the solar facilities. This area does not include the collection corridors or required setbacks. This area is also referred to as the project boundary. The site permit application refers to this as the "Buildable Area."

project area means one mile from the land control area and collection line corridor.

solar facility means ground-mounted photovoltaic equipment capable of operation at 50,000 kilowatts or more connected directly to the electrical grid and the associated facilities such as access roads and collector lines.

solar energy generation system means a set of devices whose primary purpose is to produce electricity by means of any combination of collecting, transferring, or converting solar-generated energy (Minnesota Statute 216E.01, subdivision 9a).

transmission line means power lines that operate at 69 kilovolts and above.

1 Introduction

Enbridge Solar (Plummer), LLC (Plummer Solar, applicant) is proposing to construct and operate the Plummer Solar Project (project), a 130 megawatt (MW) solar farm in Red Lake County, Minnesota. Plummer Solar must obtain a site permit from the Minnesota Public Utilities Commission (Commission) before it can construct and operate the project. The project will connect to the electric transmission grid through an existing Otter Tail Power 115 kV transmission line immediately adjacent to the project site.

The applicant filed a site permit application (application) on April 2, 2024, and the Commission found the application to be substantially complete on May 7, 2024.

The Minnesota Department of Commerce (Commerce) has prepared this environmental assessment (EA) for the proposed project. The EA describes the project, highlights resources affected by the project, and discusses potential human and environmental impacts to these resources. It also discusses ways to mitigate potential impacts. These mitigation strategies can become enforceable conditions of the Commission's site permit.

An EA is not a decision-making document, but rather an information document. The EA is intended to facilitate informed decisions by state agencies, particularly with respect to the goals of the Minnesota Power Plant Siting Act to "minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion".[1]

1.1 How is this document organized?

The EA addresses the matters identified in the scoping decision.

This EA is based on the applicant's site permit application and public scoping comments. It addresses the matters identified in the EA scoping decision (**Appendix A**).

- **Chapter 1** briefly describes the state of Minnesota's role; discusses how this EA is organized; and provides a summary of potential impacts and mitigation.
- **Chapter 2** describes the project—design, construction, operation, and decommissioning.
- **Chapter 3** summarizes the regulatory framework, including the site permit process, the environmental review process, other approvals that might be required for the project, and the criteria the Commission uses to make its decisions.
- **Chapter 4** describes the environmental setting; details potential human and environmental impacts from the Plummer Solar Project; and identifies measures to mitigate adverse impacts. It summarizes the cumulative potential effects of the project and other projects and lists unavoidable impacts and irreversible and irretrievable commitments of resources.

[1] Minnesota Statutes 216E.02, subd. 1.

- **Chapter 5** identifies the sources used to prepare the document.

1.2 What does the applicant propose to construct?

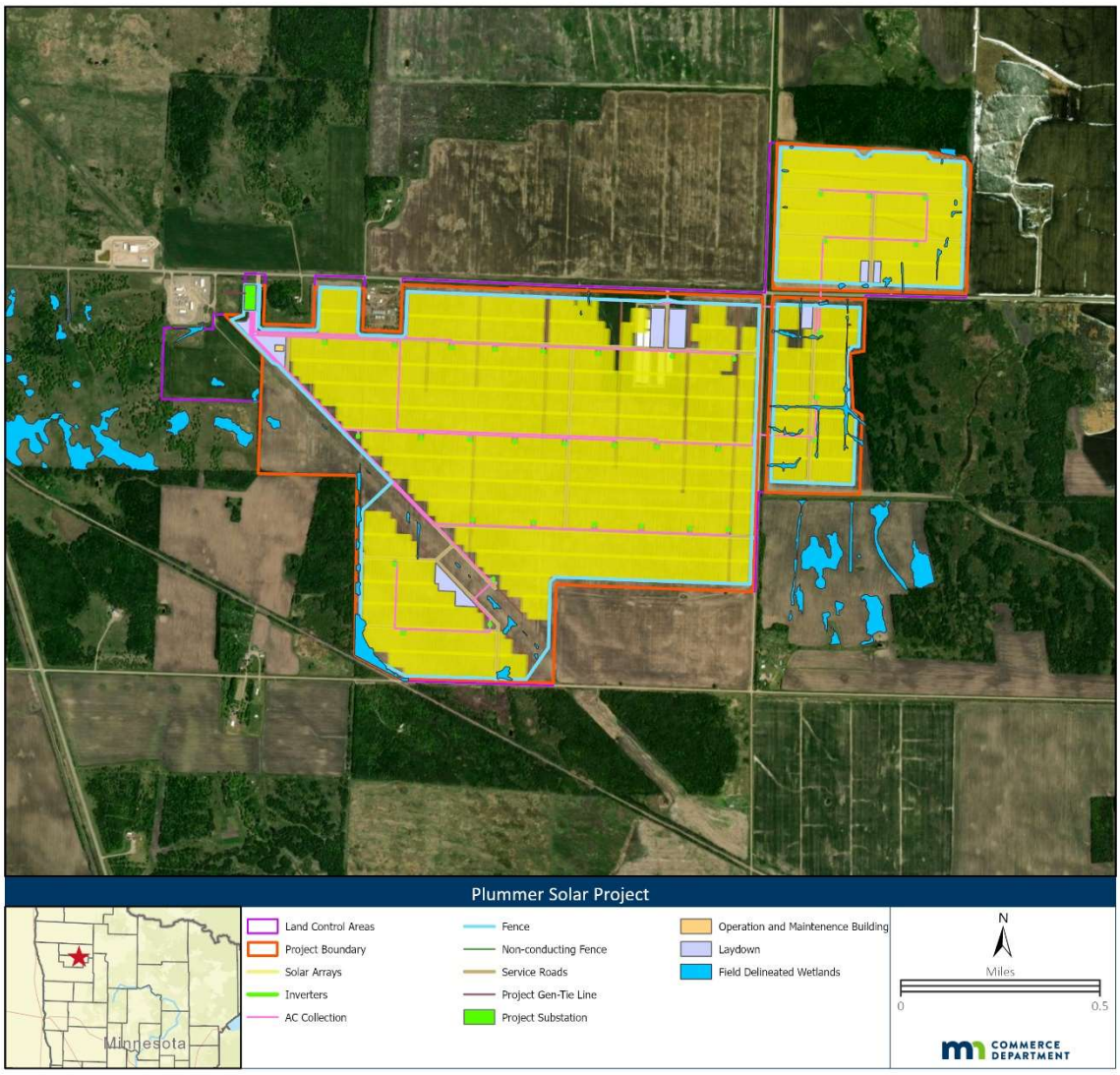
Plummer Solar proposes to construct a 130 megawatt solar energy generating system and associated facilities on a site of approximately 855 acres in Emardville Township in Red Lake County, Minnesota.

The project will consist of photovoltaic (PV) panels, trackers, inverters, transformers, access roads, security fencing, above-ground and below-ground electric collection lines, a project substation and associated facilities (Figure 1). Plummer Solar proposes to locate the solar facilities in blocks within the 855 acres of land under contract or owned by the applicant. Based on preliminary design, Plummer Solar anticipates approximately 769.9 acres within the 855-acre site will be developed for the solar facilities. The solar facilities will be connected to the project substation via 34.5 kilovolt (kV) electric collection lines, which may be a hybrid of underground and above ground installation, depending on final design. The collection corridor is estimated to comprise approximately 22 acres of the project area. A short aboveground 115 kV transmission line (<1,500 ft in length), will run from the project substation to a new switching station on the existing 115 kV transmission line located adjacent to the project.

Construction is anticipated to begin in 2026 with completion and operation anticipated in late 2027 or early 2028.[2]

[2] Id.

Figure 1. Proposed Plummer Solar Project



1.3 What is the state of Minnesota's role?

The applicant needs a site permit from the Commission to construct the project. Commerce prepared this EA. An administrative law judge will oversee a public hearing.

To build the project, the applicant needs a site permit from the Commission. The project may also require additional approvals from other federal and state agencies and local governments, for example, a driveway permit from Red Lake County or a Construction Stormwater Permit from the Minnesota Pollution Control Agency (MPCA). A site permit supersedes local zoning, building, and land use rules.[3] The Commission's site permit decision must be guided, in part, however, by consideration

[3] Minnesota Statutes 216E.10, subd. 1.

of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts."[4]

Plummer Solar applied to the Commission for a site permit for the project on April 2, 2024.[5] The Commission must consider whether the record supports issuing a site permit, and what conditions should be placed on the site permit.[6]

To ensure a fair and robust airing of the issues, the Minnesota Legislature set out a process for the Commission to follow when considering site permit applications.[7] In this instance, an EA has been prepared, and a public hearing will be held. The goal of the EA is to describe potential human and environmental impacts of the project (*the facts*), whereas the intent of the public hearing is to allow interested persons the opportunity to advocate, question, and debate what the Commission should decide about the project (*what the facts mean*). The record developed during this process—including all public input—will be considered by the Commission when it makes its decisions on the applicant's site permit application.

1.4 What is the public's role?

Minnesota needs your help to make informed decisions.

During scoping, you told us your concerns about the project so that we could collect the right facts. At the public hearing, which comes next, you can tell us what those facts mean, and if you think we have represented them correctly in this EA. Your help in pulling together the facts and determining what they mean will help the Commission make informed decisions regarding the project.

1.5 What is an Environmental Assessment?

This document is an Environmental Assessment. The Commission will use the information in this document to inform their decisions about issuing a site permit for the project.

This Environmental Assessment (EA) contains an overview of affected resources and discusses potential human and environmental impacts and mitigation measures. Energy Environmental Review and Analysis (EERA) staff within the Commerce Department (Commerce) prepared this document as part of the environmental review process. Scoping is the first step in the process. It provides opportunities to provide comments on the content of this environmental assessment, suggest alternatives, and to mitigate potential impacts.

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[4] Minnesota Statutes 216E.03, subd. 7.

[5] Plummer Solar Project, Application to the Minnesota Public Utilities Commission for a Site Permit for a Large Electric Generating Facility, April 2nd, 2024, eDockets Numbers 20244-204981-01 (through -10), 20244-204920-01 (through -09).

[6] If the Commission grants a site or route permit, it chooses which of the studied locations is most appropriate. In this matter only one site location is studied

[7] *See generally* Minnesota Statute 216E.

1.6 Where do I get more information?

For additional information don't hesitate to contact Commission or Commerce staff.

If you would like more information or if you have questions, please contact Commerce staff: Jessica Livingston (jessica.livingston@state.mn.us), (651) 539-1823 or the Commission Staff: Sam Lobby (sam.lobby@state.mn.us) (651) 201-2205.

Information about the project, including the site permit application, notices, and public comments, can be found on eDockets: https://www.edockets.state.mn.us/EFiling/search.jsp by searching "22" for year and "451". Information is also available on Commerce's webpage for the project: https://eera.web.commerce.state.mn.us/web/project/15412.

1.7 What permits are needed?

A site permit, from the Commission is required. Federal, state, and local permits may also be necessary to construct the project.

The project requires a site permit from the Commission because it meets the definition of large electric power generating plant, which is any electric power generating equipment designed for or capable of operation at a capacity of 50 MW or more.

Various federal, state, and local approvals will be required for activities related to the construction and operation of the project. These permits are referred to as "downstream permits" and must be obtained by the applicant prior to constructing the project.

1.8 What are the potential impacts of the project?

The project will impact human and environmental resources. Impacts will occur during construction and operation.

A potential impact is the anticipated change to an existing condition caused directly or indirectly by the project. Potential impacts can be positive or negative, short- or long-term, and can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations. The impacts of constructing and operating a project can be mitigated by avoiding, minimizing, or compensating for the adverse effects and environmental impacts of a project.

The context of an impact—in combination with its anticipated on-the-ground effect and mitigation measures—is used to determine an impact intensity level, which can range from highly beneficial to highly harmful. Impacts are grouped: archeological and historic resources, human settlement, human health and safety, public services, land-based economies, and natural resources.

Select resource topics received abbreviated study because they were deemed to be of minor importance to the Commission's site permit decision. Potential impacts are anticipated to be negligible to displacement, communication, implantable medical devices, forestry, and mining.

1.8.1 Human Settlement

Large energy projects can impact human settlement. Impacts range from short-term, such as increased local expenditures during construction, to long-term, such as changes to viewsheds.

Aesthetics The impact intensity level is expected to be moderate and long-term. Locations where visual impacts may potentially be the greatest are adjacent to residences and along public roadways. The solar arrays will be visible from nearby residences and adjacent roadways.

Cultural Values The impact intensity level is anticipated to be minimal. The project is not anticipated to impact or alter the work and leisure pursuits of residents in such a way as to impact the underlying culture of the area. Differences between cultural values related to renewable energy and rural character has the potential to create tradeoffs that cannot be addressed in the site permit.

Land Use and Zoning The impact intensity level is anticipated to be moderate due to the conversion of agricultural land to land used for energy generation. Land use impacts are anticipated to be long-term and localized. Constructing the project will change land use from agricultural to solar energy production for a minimum of 30 years. After the project's useful life, the land control area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. Impacts can be minimized by using best practices to protect land and water quality.

Noise Distinct noises are associated with the different phases of project construction. The impact intensity level during construction will range from negligible to significant depending on the activity. Potential impacts are anticipated to be intermittent and short-term. These localized impacts may affect nearby residences and might exceed state noise standards. Impacts are unavoidable but can be minimized. Operational impacts are anticipated to be negligible.

Property Values Impacts in the local vicinity are anticipated to be minimal to moderate and decrease with distance and over time. Impacts to the value of specific properties within the local vicinity are difficult to determine but could occur.

Tourism and Recreation The impact intensity level to tourism and recreation resources is anticipated to be minimal. Most impacts will be short-term and related to construction.

Public Services Potential impacts to the electrical grid, roads and railroads, and other utilities are anticipated to be short-term, intermittent, and localized during construction. Impacts to water (wells and septic systems) are not expected to occur. Overall, construction-related impacts are expected to be minimal, and are associated with possible traffic delays. During operation, negligible traffic increases would occur for maintenance. Impacts are unavoidable but can be minimized.

Socioeconomics The impact intensity level is anticipated to be minimal to significant and positive. Effects associated with construction will, overall, be short-term and minimal. Significant positive effects may occur for individuals. Impacts from operation will be long-term and significant. Adverse impacts are not anticipated.

Economic Justice The project will not have disproportionately high and adverse human health or environmental effects on low-income, minority, or tribal populations

1.8.2 Human Health and Safety

Large energy projects have potential to impact human health and safety. Most concerns are related to the construction phase.

Electronic and Magnetic Fields (EMF) Impacts to human health from possible exposure to EMFs are not anticipated. Potential impacts will be long-term and localized. These unavoidable impacts will be of a small size. Impacts can be mitigated.

Public Safety and Emergency Services Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Public risks involve electrocution. Electrocution risks could also result from unauthorized entry into the fenced area. There is the potential to encounter land has previously been impacted by hazardous substances, and if this occurs, hazardous materials must be documented, monitored, and disposed in coordination with MPCA. Potential impacts are anticipated to be minimal. Impacts would be short- and long-term and can be minimized.

1.8.3 Land-based Economies

Large energy projects can impact land-based economies by limiting land use for other purposes.

Agriculture Potential impacts to agricultural producers are anticipated to be minimal—lost farming revenues will be offset by easement agreements. A negligible loss of farmland in Red Lake County would occur for the life of the project. With respect to prime farmland, the applicant indicates that no feasible or prudent alternatives to the project exist. Potential impacts are localized and unavoidable but can be minimized.

Tourism Impact intensity is expected to be minimal, and short-term in duration. There may be potential for impacts to local recreational activities during construction, however impacts will be temporary.

1.8.4 Archeological and Historic Resources

The impact intensity level is anticipated to be negligible to minimal. Impacts would be localized. Impacts can be mitigated through siting and construction monitoring.

1.8.5 Natural Resources

Large energy projects can impact the natural environment. Impacts are dependent upon many factors, such as how the project is designed, constructed, maintained, and decommissioned. Other factors, such as the environmental setting, influence potential impacts. Impacts vary significantly within and across projects.

Air Quality Potential impacts to air quality during construction would be intermittent, localized, short-term, and minimal. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated. Once operational, the solar array will not generate criteria pollutants or carbon dioxide. Negligible fugitive dust and exhaust emissions would occur as part of routine maintenance activities. Impacts are unavoidable and do not affect a unique resource. Impacts can be minimized.

Geology and Groundwater Impacts to geology and domestic water supplies are not expected. Localized impacts to groundwater resources, should they occur, would be intermittent, but have the potential to occur over the long-term. Indirect impacts from surface waters might occur during construction. Impacts can be mitigated through use of Best Management Practices (BMPs) for stormwater management

Soils Impacts to soils will occur during construction and decommissioning of the project. The impact intensity level is expected to be minimal. Potential impacts will both positive and negative, and short- and long-term. Isolated moderate to significant negative impacts associated with high rainfall events could occur. Because the soil at the solar facility will be covered with native perennial vegetation for the life of the project, soil health is likely to improve.

Surface Water The impact intensity level is anticipated to be minimal. Direct impacts to surface waters are not expected. Indirect impacts to surface waters may occur. These impacts will be short-term, of a small size, and localized. Impacts can be mitigated.

Wetlands The impact intensity level is anticipated to be minimal. Although there is a potential for wetland to be indirectly affected, direct impacts are not expected. These impacts will be short-term, of a small size, and localized. Impact can be mitigated.

Vegetation The solar facility will convert row crop farmland to perennial vegetation for the life of the project. Potential impacts of the solar facility can be mitigated through development of a VMP.

Wildlife and Habitat Potential impacts may be positive or negative and are species dependent. Long-term, minimal positive impacts to small mammals, insects, snakes, etc. would occur. Impacts to large wildlife species, for example, deer, will be negligible. Significant negative impacts could occur to individuals during construction and operation of the project. Once restored, the land control area will provide native habitat for the life of the project. The project does not contribute to significant habitat loss or degradation or create new habitat edge effects. The introduction of PV panels and fencing, creates the potential for bird collisions. Potential impacts can be mitigated in part through design and BMPs. The impact intensity level is expected to be minimal.

Rare and Unique Resources The impact intensity level is anticipated to be minimal. Impacts could be both short and long term and could be positive (e.g., through introduction of habitat), or negative (e.g., by removing trees during breeding or migratory season). Impacts can be mitigated.

Climate Change Construction emissions will have a short- term negligible increase in greenhouse gases that contribute to climate change. Overall, the project will generate energy that can be used to displace energy otherwise generated by carbon-fueled sources. The total GHG emissions produced by construction and operation of the project will be minimal when compared to the reduction in GHG emissions long-term. The project's design incorporates design elements that minimize impacts from the increase in extreme weather events such as increase flooding, storms, and heat wave events that are expected to accompany a warming climate.

1.9 What factors guide the Commission's decision?

Minnesota statute and rule identify the factors the Commission must consider when determining whether to issue a site permit.

After reviewing the project record—including public comments—the Commission will determine whether to issue a site permit and, if a site permit is issued, where the solar facility will be located and what permit conditions are appropriate.

Minnesota Statutes 216E.03 lists considerations that guide the study, evaluation, and designation of site permits. Minnesota Rule 7850.4100 lists the factors the Commission must consider when making a site permit decision.

A. Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.

B. Effects on public health and safety.

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.

D. Effects on archaeological and historic resources.

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna.

F. Effects on rare and unique natural resources.

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.

H. Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries.

I. Use of existing large electric power generating plant sites.

J. Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way.

K. Electrical system reliability.

L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route.

M. Adverse human and natural environmental effects which cannot be avoided.

N. Irreversible and irretrievable commitments of resources.

The Commission is also guided by the "state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure."[8]

1.10 Solar Facility Siting Factors – Analysis and Discussion

This analysis applies the siting factors to the project. Some factors are described in just a few words. Other factors are more descriptive and include a list of elements that, when grouped, make up the factor. Finally, certain factors are relatively succinct, but the scoping process identified elements to be analyzed in this EA. For example, the public safety factor includes an EMF element.

[8] Minnesota Statutes 216E.03, subd. 7(a).

Factor M (unavoidable impacts) and **Factor N** (irreversible and irretrievable resource commitments) are discussed in Section 4.8 and Section 4.9, respectively, of this EA.. **Factor G** (application of design options) and **Factor L** (costs dependent on design) do not apply as the design of the proposed project is the only design under consideration.

Other factors are ranked as follows:

●	Impacts are anticipated to be negligible to minimal and able to be mitigated or consistent with factor
○	Impacts are anticipated to be minimal to moderate and able to be mitigated in part or less consistent with factor, but nonetheless consistent
⊘	Impacts are anticipated to be moderate to significant and unable to be mitigated fully or consistent in part or not consistent with factor

Table 1 Application of Siting Factors- Solar Facility

Factor A: Human Settlement		
Element	**Construction**	**Operation**
Aesthetics	○	○
Displacement	●	●
Cultural Values	○	○
Electric Interference	●	●
Environmental Justice	●	●
Floodplains	●	●
Land Use and Zoning	●	●
Noise	⊘	●
Property Values	○	○
Recreation	○	●
Socioeconomics	●	●
Factor B: Public Services		
Element	**Construction**	**Operation**
Airports	●	●
Roads	○	●
Utilities	●	●
Factor C: Public Safety		
Element	**Construction**	**Operation**
EMF	●	●
Emergency Services	●	●

Medical Devices	●	●
Public Safety	●	●
Stray Voltage	●	●
Worker Safety	●	●
Factor D: Land-based Economies		
Element	**Construction**	**Operation**
Agriculture	○	○
Forestry	●	●
Mining	●	●
Tourism	●	●
Factor E: Archaeological and Historic Resources		
Element	**Construction**	**Operation**
Archeological	●	●
Historic	●	●
Factor F: Natural Resources		
Element	**Construction**	**Operation**
Air Quality	●	●
Climate Change	●	●
Geology and Groundwater	●	●
Soils	●	●
Surface Water	●	●
Topography	●	●
Vegetation	●	●
Wetlands	●	●
Wildlife	●	●
Wildlife Habitat	●	●
Factor G: Rare and Unique Resources		
Element	**Construction**	**Operation**
Fauna	●	●
Flora	●	●
Factor H: Use of Existing Generating Plants		
Element	**Construction**	**Operation**
Existing Plants	⊘	⊘

1.10.1 Discussion

The following discussion highlights potential impacts to factor elements that are anticipated to be moderate to significant, and factors determined less consistent, consistent in part, or not consistent.

FACTOR A: HUMAN SETTLEMENT

Aesthetics Visual impacts are subjective. Thus, potential impacts are unique to the individual and can vary widely. Because there are existing energy and infrastructure facilities nearby (Figure 8), the project will not be an entirely new type of feature on the landscape. For those with high viewer sensitivity, for example, neighboring landowners, visual impacts are anticipated to be moderate to significant, while for those that travel through the project area, visual impacts are likely to be minimal, although noticeable.

Cultural Values The project is not anticipated to impact or alter the work and leisure pursuits of residents in such a way as to impact the underlying culture of the area. Differences between cultural values related to renewable energy and rural character has the potential to create tradeoffs that cannot be addressed in the site permit

Environmental Justice The project is not anticipated to have disproportionately high or adverse human health or environmental effects on low-income, minority, or tribal populations.

Land Use and Zoning Land use impacts are anticipated to be long-term and localized. The proposed solar facility is consistent with local land use ordinances and comprehensive land use plans. Constructing the project will change land use from agricultural to solar energy production for a minimum of 30 years. After the project's useful life, the land control area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. Impacts can be minimized.

Noise Distinct noises are associated with the different phases of project construction. These impacts will be temporary and intermittent and range from negligible to significant depending on the construction equipment used and the location of the listener.

Property Values On whole, impacts to property values are anticipated to be minimal and to decrease with distance and over time. However, impacts to a specific property's value are difficult to determine. Because of this uncertainty, impacts to specific properties could be minimal to moderate.

Recreation Potential impacts to recreational resources associated with construction are anticipated to be short-term, intermittent, and localized. The impact intensity level is expected to be minimal to moderate, most likely occurring due to increased traffic and noise from construction. During operation, no impacts to recreation are anticipated; negligible traffic increases would occur for maintenance.

Transportation Potential impacts to roads and highways associated with construction are anticipated to be short-term, intermittent, and localized. The impact intensity level is expected to be minimal to moderate. During operation, no impacts to roads are anticipated; negligible traffic increases would occur for maintenance.

FACTOR C: LAND-BASED ECONOMICS

Agriculture Potential impacts to agricultural producers are anticipated to be minimal—lost farming revenues will be offset by easement agreements. A negligible loss of farmland in Red Lake County would occur for the life of the project. The project will not impact prime farmland. Potential impacts are localized and unavoidable but can be minimized.

FACTOR E: NATURAL RESOURCES

Geology and Groundwater Impacts to geology and domestic water supplies are not expected. Localized impacts to groundwater resources, should they occur, would be intermittent, but have the potential to occur over the long-term. Indirect impacts from surface waters might occur during construction. Impacts can be mitigated through use of BMPs for stormwater management.

Soils Impacts to soils will occur during construction and decommissioning of the project. The impact intensity level is expected to be minimal to moderate. Potential impacts will both positive and negative, and short- and long-term. Isolated moderate to significant negative impacts associated with high rainfall events could occur but can be mitigated with erosion prevention and sediment control BMPs. Because the soil at the solar facility will be covered with native perennial vegetation for the life of the project, soil health is likely to improve.

Wildlife and Habitat Impacts wildlife are anticipated to be minimal to moderate during construction and operation of the project. Additional BMPs can be implemented to avoid impacts to local and rare and unique wildlife (e.g., migratory birds.)

FACTOR I: POWER PLANTS

Because the solar facility is not constructed at an existing power plant, the solar facility is inconsistent with this siting factor.

1.11 What's next?

A public hearing will be held in the project area; you can provide comments at the hearing. The Commission will then review the record and decide whether to grant a site permit

An administrative law judge (ALJ) from the Office of Administrative Hearings will hold a public hearing after the EA is complete and available. At the hearing you may ask questions and submit comments about the project. After the close of the comment period, the ALJ will provide a written report to the Commission with findings, conclusions, and recommendations for the Commission.

The Commission reviews all the information in the project record in determining whether to issue a site permit. Site permits define the location of the project and include conditions specifying mitigation measures. The Commission is expected to make a site permit decision in the first half of 2025.

2 Proposed Project

Plummer Solar proposes to construct and operate an up to 130 MW solar farm in Emardville Township, Red Lake County, Minnesota. The project will occupy approximately 855 acres southeast of the city of Plummer. The project will interconnect to the electrical grid through a project substation and a short 115 kV transmission line to an existing Otter Tail Power 115 kV transmission line immediately adjacent to the project site. This chapter describes the project and how it would be constructed, operated, and decommissioned.

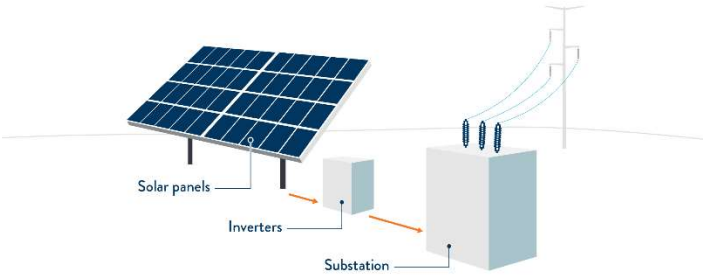
2.1 Solar Facility

2.1.1 How do solar facilities generate electricity?

The *photovoltaic effect* is the physical process through which a PV cell coverts sunlight directly into electricity by capitalizing on nature's inherent desire to keep electrical charges in balance.

When direct and indirect solar radiation (direct and scattered sunlight) strikes a PV cell, some radiation is absorbed, which excites electrons within the cell. This results in a continuous flow of electrons from the front to the back of the panel through electrical connections, which results in a continuous flow of electric

Figure 2. Solar Facility Schematic



Solar panels (sometimes referred to as solar modules) are made up of PV cells that generate direct current (DC) electricity, which must be converted to alternating current (AC) electricity before reaching the electrical grid. Solar panels are arranged into electrically connected blocks and connected to inverters. An inverter converts DC electricity to AC electricity. Transformers then step up the electrical voltage before the electrical power is collected through an above- or below-ground collection system. Collection systems combine the electricity from across the array and deliver it to a project substation. Figure 2 shows a simplified schematic of the major components of the solar generating facility.

2.1.2 Where is the Project located?

The Project is located in Emardville Township in Red Lake County, Minnesota (Figure 1).

As shown in Figure 1, the solar facility is located in Emardville Township in Red Lake County, south and east of the city of Plummer. US Highway 59 runs north-south approximately 0.8 mile west of the project area. Error! Reference source not found. summarizes the project location. The solar facility would be located on approximately 769.9 acres within an area of approximately 855 acres of land owned or leased by the applicant or one of its affiliates. The site is currently used as cultivated farmland.

Plummer Solar selected the site based on proximity to existing electric transmission infrastructure, sufficient solar resource, landowner participation, consistency with local land use, and anticipated minimal impact to natural and cultural resources.[9]

Table 2: Project Location

Township	Range	Sections	Township	County
151	42	12, 13, 14, 15	Emardville	Red Lake

2.1.3 How is the solar facility designed?

The Project will consist of will consist of photovoltaic (PV) panels, trackers, inverters, transformers, access roads, security fencing, above-ground and below-ground electric collection and communication lines, a project substation and interconnection facilities, conduit, metering and switchgear, step-up transformers, SCADA system, an operation and maintenance facility, seven weather stations, a stormwater management system, laydown yards, and a short aboveground 115 kV transmission line.

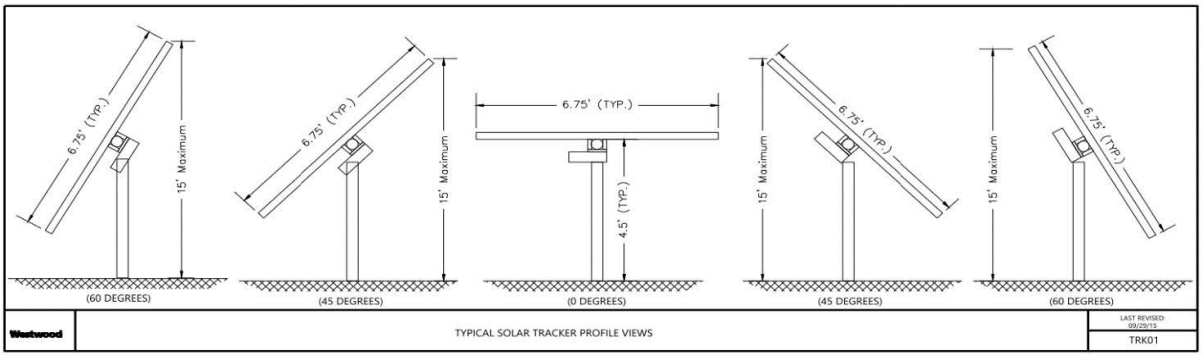
2.1.3.1 SOLAR ARRAYS

Plummer Solar anticipates using panels affixed to tracking mechanisms that will allow the panels to track the sun from east to west. The arrays are arranged in rows oriented north and south. Small motors rotate the panels to follow the sun throughout the day, tilting east in the morning, paralleling the ground at zero degrees mid-day, and tilting west in the afternoon. This tracking of the sun maximizes the project's electrical production. When tilted to their highest position (early and late in the day), the top edge of the solar panels will be 9-12 feet above the ground. A portion of arrays may be elevated in order to protect the panels in the event of flooding, and the impact of snow accumulation could also result in elevated arrays. The project will require approximately 293,448 PV panels to establish the up to 130 MW AC capacity mounted on an estimated 4,400 single axis trackers.[10]

[9] SPA, pp. 10 – 11
[10] SPA, pp. 21 – 22

Figure 3. Typical Solar Array

Figure 4. Typical Solar Tracking Profile



2.1.3.2 Electrical Collection System

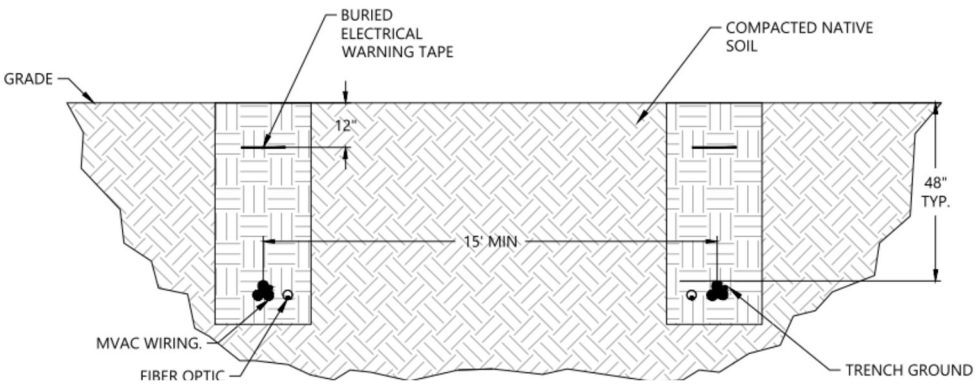
The direct current (DC) electrical energy generated by the solar panels (about 1,500 volts DC) will be delivered to approximately 34 inverters through either entirely underground or a combination of buried and aboveground cables. The inverters convert the electricity to about 630 volts (depending upon inverter specifications) alternating current (AC) and then the transformer will step up the power to 34.5 kV for transmission through an underground collector system and transmit it to the project substation adjacent to the point of interconnection. Power inverters will be placed on inverter "skids" on top of concrete slab or pile foundations approximately 10 feet wide by 22 feet long. The height of a skid will be approximately 1.5 feet above grade, or as required to achieve clearance of 12 inches from 100-year flood depth and average snow accumulation at each location. Typical pad mounted transformers that will be

Figure 5. Inverter

located on the inverter skids are approximately 8 ft wide, 20 ft long, and 9.5 ft tall.[11] From a distance, inverters skids will look like one-half of a semi-trailer box (Figure 5). The skids will be placed on concrete slab or pier foundations. The final number of inverters will depend on the inverters selected for the project as well as the final solar panel configuration.

Electrical energy (34.5 kV AC) will be transmitted from inverter skids to the project substation through underground cables (Figure 6). Cabling will be trenched or plowed into place to a dept of at least three feet, deeper if necessary to avoid other utilities or infrastructure, such as an existing pipeline ROW.[12]

Figure 6: Underground Cabling



2.1.3.3 FENCING

All solar arrays will be fenced for security. Permanent security fencing will be installed along the perimeter of the project. The perimeter fencing around the project will be 8 feet tall chain link topped with 3 strand tensile wire.[13] Plummer Solar has indicated that perimeter fencing will be installed following the DNR's Commercial Solar Siting Guidance in order to mitigate disruption to local animal populations. The perimeter fence will have locked gates at access points.[14]

2.1.3.4 ACCESS ROADS

Although the total length of access roads will depend upon final site design, the preliminary layout anticipates approximately 8.14 miles of graveled access roads. These roads will be used for operations and maintenance activities. Roads will be approximately 16 feet wide with 2 feet of shoulder on each side. Access roads may be temporarily wider during construction, then reduced in width for long term site access upon completion.[15]

[11] SPA, pp. 21-22
[12] Id.
[13] Appendix D, Response to Data Requests
[14] SPA, p. 24
[15] Id.

2.1.3.5 PROJECT SUBSTATION

The project substation is proposed to be located in the northwest portion of the project site adjacent to the existing Enbridge Plummer Pump Station (Figure 8. Area Energy Infrastructure). The substation will be located inside the project fence and is estimated to occupy approximately 1.3 acres of agricultural land. The project substation will include a 34.5/115 kV step-up substation with metering and switchgear required for interconnection to the transmission grid. Other components of the substation include supporting structures for high voltage electrical structures, breakers, transformers, lighning protection, metering and switchgear, and control equipment according to the specifications of the Interconnection Agreement with MISO. Underground 34.5 kV collector lines from the inverters will deliver energy to the project substation. The collector system voltage will be stepped up from 34.5 kV to 115 kV at the substation. Two structures, the collector pole and the dead-end structure will be within the project substation, anticipated to be up to approximately 95 ft tall. The final project substation design will be in accordance with applicable utility practices and codes. If necessary, the project substation will be graded and overlain with crushed rock. Secondary containment areas for the transformer will be installed as necessary.

FENCING

The fenced area of the project substation is estimated to be 170 by 330 ft in size, subject to final substation layout. Fencing is expected to be a 8 ft high chain link fence topped with 3 strands of high-tensile wire. A lockable gate will be installed with the project substation site fencing, and the final design of the fence will prevent the public and wildlife from gaining access to the facility. Substation fencing will be compliant with electrical codes and the National Electric Safety Code (NESC).

2.1.4 How would the solar facility be constructed?

Plummer Solar anticipates that construction of the solar facility will begin in 2026 with an in-service date of no later than December 31, 2028. This section summarizes construction activities. Unless otherwise noted, this summary has been adapted from Section 4.3.1 and Appendix G, the *Agricultural Impact Mitigation Plan* (AIMP), of the site permit application.

Plummer Solar anticipates that construction will begin in 2026 to meet an in-service goal of late 2027 or 2028. The actual construction schedule is dependent upon permitting, final design, delivery of equipment, and workforce availability.

Construction will begin after all necessary permits and approvals have been received including a large generator interconnection agreement from MISO. Project construction will begin with workforce mobilization and the initial site preperation including vegetation removal, and grading. Construction will likely take place over two construction seasons. Plummer Solar anticipates approximately five laydown yards on 14 acres of the project area. The applicant anticipates minimal grading due to site slopes between zero and two percent.

Typical construction equipment will be used for the project – scrapers, bulldozers, dump trucks, motor graders, vibratory compactors, pile drivers, watering trucks, pickup trucks, and backhoes. Additional specialty equipment could include a skid steer loader, concreate truck and boom truck, a high reach bucket truck, a medium duty crane, forklift, and a truck-mounted auger or drill rig. Upon completion of construction, heavy equipment will be removed from the project site.

The applicant estimates that for several weeks – during delivery of the trackers and solar panels – there will be between 10 and 20 semi-truck deliveries daily. Traffic will decrease once these components are delivered. Traffic volume during construction will predominantly come from worker travel to the construction site.

The applicant estimates that the project will create approximately 150-200 temporary jobs for construction and installation phases, and 3-4 permanent full-time jobs for the project operation phase.

After initial site preparation, access roads, project substation, solar arrays, inverters, electrical collection cables, the collector lines, and fencing would be constructed.

Access Roads

Construction of access roads will start at permanent site entrances and move inside the project. Heavy equipment will stay on the newly constructed road to not disturb existing ground. If drainage improvements are needed, and not completed in conjuction with initial site stabilization prior to construction, they will be completed at the same time as access roads.

Solar Arrays

Solar array foundation will be installed first after road completion for a specific area. Foundation installation will minimize travel through each area. If soil conditions are wet and there is risk to damaging vegetation, mats (composite or wooden) will be used as needed to minimize impact.

After foundation has been installed, racking installation will begin. Racking components will be distributed across the array using lightweight equipment, with crew walking across the array to secure the racking. After the racking is installed, PV modules will be distrubted between tracker rows and installed by hand.

Project Substation

Construction of the project substation will take place simulateously with the solar arrays. If grading is required for the substation and access roads, it will have already been completed. The grounding grid and underground conduit will be installed in conjunction with the foundations for the transformer, control housing, and high voltage structures. After this is complete, the substation equipment will be delivered and installed on the prepared foundations. Secondary containment areas for the transformer will be constructed as necessary and finish grading will occur around the substation. Final construction activities for the project substation will include stringing the elctrical wires, installing the perimeter fence, and placing rock throughout the interior of the fenced area and 3ft outsided the fence.

Inverters and Step-up Transformers

The panels deliver direct current (DC) power to the inverters, where the power is converted to alternating current (AC). The voltage is then stepped up to 34.5 kV at the adjacent electric transformer. Inverter skids (each containing an inverter, transformer, and SCACA equipment) will be installed on concrete or pile foundations.

Electrical Collector System

Plummer Solar anticipates using both underground and above-ground 34.5 kV DC collector cables within the arrays, depending upon final design. The electrical collection system will be installed below-ground for the AC electrical collection system and will be placed at least three feet underground, if not deeper for installation under existing utilities or other features. There is an existing pipeline that runs through the project area, crossing the site diagonally from the northwestern corner to the center of the southern boundary, and continuing south onwards. The electric collection system will need to cross the pipeline right-of-way in one location at the SW corner of the project. At that location the 34.5kV AC collection system will cross underneath the pipelines.[16] Plummer Solar indicates that the method, length, and depth of burial are to be determined. Aside from that single crossing location, the collection system will run alongside the pipeline right-of-way. Cabling will be done in accordance with the agricultural impact mitigation plan (AIMP); topsoil and subsoil will be segregated and stockpiled. Once cabling is installed in the trench, the trench will be backfilled with native subsoil followed by topsoil to return the surface to its finished grade.[17]

Stormwater Drainage

Plummer Solar indicates that it may include permanent and temporary stormwater basins as part of its stormwater treatment system. This stormwater system will be designed to capture, route, and treat stormwater runoff for volume control and water quality per Minnesota's Construction Stormwater General Permit. A construction stormwater permit and associated Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to construction and implemented during construction.

Fencing

Plummer Solar will install permanent security fencing around the perimeter of the project site. Fencing is anticipated to be chain link fencing with a height of approximately eight feet from the ground with 3 strand high-tensile wire at the top. The perimeter security fence will have locked gates as access points. Motion-activated operational lighting will be installed at gates and perimter areas.

Restoration

After construction, disturbed areas will be reseeded with native and non-native seed mixes in accordance with the project's vegetation management plan (VMP) and agricultural impact mitigation plan (AIMP).

Plummer Solar has prepared a draft VMP (Appendix H of the site permit application) outlining how the site will be revegetated, maintained, and monitored over the life of the project to ensure restoration goals and objectives are met. Once vegetation at the site has been established, mowing will be done only when necessary to ensure safe operation of the facility. Mechanical removal and selective use of herbicides may be used to treat unwanted woody species that may shade out panels

[16] SPA, Appendix B, Figure 3.
[17] SPA, Appendix G. Agricultural Impact Mitigation Plan.

and noxious and perennial weeds. Plummer Solar is also maintaining the option to utilize grazing as a management tool for the project.[18]

2.1.5 How would the solar facility be operated and maintained?

Plummer Solar estimates the service life of the project to be 30 years.[19] Operational staff will be actively engaged during the construction phase of the project. Following commissioning, control of the solar facility will transfer from the construction team to the operations staff. The operations team will be responsible for ensuring operations and maintenance are conducted in compliance with all applicable permits and regulatory requirements, industry practices, and manufacturer's recommendations. It is anticipated that 3-4 new full time staff will operate and maintain the project.

The applicant indicates that a maintenance plan will be created for the project to ensure performance of the solar facility. 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, but some maintenance activities may be performed in the evenings to minimize lost generation. Maintenance activites that have the potential for substantial noise generation will be performed during the daytime to minimize impacts to residents.

Maintenance of the project will include inspection of electrical equipment, visual and noise inspections, vegetation management, and snow removal (as needed). The electrical performance of the project will be monitored in real-time by a supervisory control and data acquisition (SCADA) system. The SCADA system allows for early notification of abnormal operations, which facilitates prompt maintenance and repair. On site personnel will have ready access to site operating data and will be notified of faults and alarms as well as abnormal operations on a real time basis.

[18] SPA, Appendix H. Vegetation Management Plan.
[19] SPA, p. 32

Table 3. Regular Operations and Maintenance Tasks

Equipment	Task
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 connection equipment and the grounding network, check for water and dust
Electric Boards	Check of the main switches and safety devices (fuses)
Noise	Check for abnormal sounds
Cabling and wiring	Visual check of electrical lines (where visible) and connection box to verify status
Transmission line	Routine visual expection of transmission line, structures and components
Project substations	Scheduled visual inspections

2.1.6 What happens at the end of the solar facility's useful life?

As the project progresses through its service life, the applicant may seek to repower the project. The applicant's decision on whether to pursue repowering will consider the equipment performance, maintenance costs, extending the useful life of the project, or a desire to increase generation output. Any site permit issued by the Commission will specify the maximum generating capacity, so if the generation capacity increases, the existing site permit must be amended. At the end of the Project's useful life, Plummer Solar will either take the necessary steps to continue operation of the Project (re-permitting and retrofitting) or will decommission the Project.

Commission issued site permits require that the permittee be responsible for removing all project components and restore the site to pre-construction conditions at the end of a project's useful life and that the permittee is responsible for all costs associated with decommissioning the project. Plummer Solar provided a draft decommissioning plan as Appendix I of its site permit application.

If the project is not repowered, Plummer Solar will decommission the project and remove the project facilities. Decommissioning would include removal of the solar arrays (panels, racking, and steel posts), inverters, fencing, access roads, and lighting. Above-ground electrical and communications cabling would be removed; below-ground cabling would be removed to a depth of four feet.

Plummer Solar anticipates that the total estimated cost to decommission the Project is approximately $9,700,000 ($74,615 per MW). Estimated salvage/scrap value is approximately $12,500,000,

offsetting the cost resulting in $2,800,000 in surplus, or $21,539 in surplus per MW. The decommissioning bond will be posted no earlier than the tenth anniversary of operation. The cost of decommissioning will be updated every five years after the tenth year of operation.

2.2 Project Costs

Plummer Solar estimates the total cost to construct the project to be approximately in the range of $184 to $267 million (Table 4). Plummer Solar indicates that this relatively large cost range reflects fluctuating market conditions and component costs. The range also reflects fluctuating MISO interconnection cost estimates; interconnection costs will be provided at the completion of MISO's Phase I studies.[20] Actual costs will depend on final material and labor costs, and salvage value from decomissioning.

Table 4. Estimated Project Cost Ranges[21]

Project Component	Estimated Cost ($USD millions)
Engineering, procurement, and construction contractor	110-150
PV Modules	50-60
Development expense	2-4
Interconnection (preliminary)	0-20
Financing (Allowance for funds used during construction)	15-20
Transmission	1-3
Substation	6-10
Total Installation Cost	**184-267**
Decommissioning	10
Salvage Value	(13)
Total Project Cost	**181-264**

[20] Appendix D. Response to Data Request 1.
[21] Id.

2.3 Project Schedule

Plummer Solar anticipates the project will begin commercial operation by the end of 2028. Table 5 shows Plummer Solar's estimated development and construction milestones.

Table 5. Anticipated Project Schedule[22]

Activity	Anticipated Timeframe
Land Acquisition	Completed in 2023
MISO Interconnection Application	Q1 2025
Commission Site Permit	Q1/Q2 2025
Downstream Permits	Prior to construction
Equipment Procurement and Contractor Selection	2025
Construction	Begin in 2026, complete in 2027
Testing and Commissioning	2027
Commercial Operation Date	2028

[22] SPA, p. 5

3 Regulatory Framework

Chapter 3 discusses the site permit approval required from the Commission. It describes the environmental review process and lists the factors the Commission considers when making its decision. This chapter also discusses required approvals from federal and state agencies and local units of government with permitting authority for actions related to the project. Lastly, it lists topics outside the scope of this EA.

3.1 What Commission approvals are required?

The project requires a site permit from the Commission before it can be constructed.

The project requires a site permit from the Commission because it meets the definition of a *large electric power generating plant*, which means any electric power generating equipment designed for or capable of operation at a capacity of 50 MW or more (Minn. Stat. 216E.01, subd. 5). Because the project was selected through a competitive bidding process approved by the Commission under Minn. Stat. 216B.2422, the project is exempt from the certificate of need requirement in Minn. Stat. 216B.243.

3.2 What is environmental review?

Environmental review informs interested persons about potential impacts and possible mitigation measures associated with the project; environmental review informs Commission decisions.

Minnesota law requires that potential human and environmental impacts be analyzed before the Commission decides whether to grant a site permit. This analysis is called environmental review.

Minnesota law provides the Commission with two processes to review site permit applications. The alternative process, which applies to solar generating facilities, such as the project, requires an EA instead of an environmental impact statement and a public hearing instead of the more formal contested-case hearing.[23,]

3.3 What permitting steps have occurred to date?

The Commission accepted the site permit application as complete on May 7, 2024. Public information and scoping meetings were held in Plummer, Minnesota on May 29, 2024, and online on May 30, 2024.

[23] Minnesota Statutes 216E.04, subd. 1 and 5; Minn. R. 7850.3700, subp. 1. Applicants are free to elect the alternative process if their project qualifies for it.

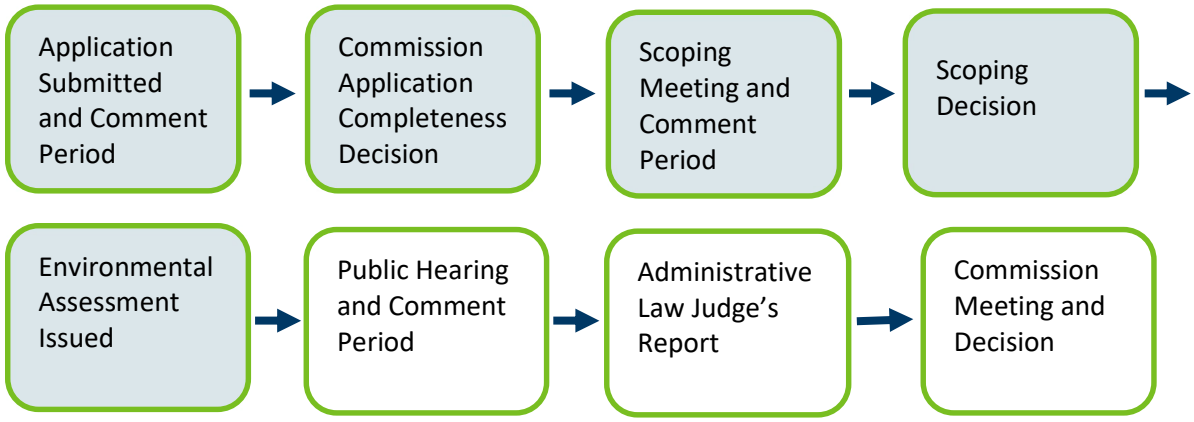
Application Filing and Acceptance

Plummer Solar provided the required written notice of its intent to file a site permit under the alternative process on March 5, 2024.[24]

Plummer Solar filed an application for a site permit on April 2, 2024.[25] The Commission accepted the application as substantially complete in its order dated May 7, 2024.[26] The order also referred the matter to the Office of Administrative Hearings for appointment of an administrative law judge (ALJ) to conduct a public hearing for the project. Commission staff provided a *Sample Site Permit for a Solar Energy Generating System* on August 14, 2024.[27]

Figure 7. outlines the permitting process as it has unfolded for this project.

Figure 7. Permitting Process Summary[28]



Scoping Process

Scoping is the first step in the environmental review process. It helps focus the EA on the most relevant information needed by the Commission to make informed decisions.

Scoping includes a public meeting and comment period that provide opportunities for interested persons to help develop the scope (or contents) of the EA.[29] The purpose of the public information and scoping meetings is to provide information and answer questions about a proposed project and

[24] Plummer Solar, Notice of Intent by Enbridge Solar (Plummer), LLC to Submit a Site Permit Application under the Alternative Permitting Process Docket No. IP-7103/GS-22-451., March 5, 2024, eDocket ID: 20243-204096-01

[25] Plummer Solar Project, Application to the Minnesota Public Utilities Commission for a Site Permit for a Large Electric Generating Facility, April 2nd, 2024, eDocket ID: 20244-204981-01 (through -10), 20244-204920-01 (through -09).

[26] Commission, *Order*, May 7, 2024, eDocket ID: 20245-206457-01

[27] Commission Staff, Sample Solar Site Permit, August 14, 2024, eDockets No. 20248-209467-01

[28] Read from left to right; shaded steps are complete.

[29] Minn. R. 7850.3700, subp. 2.

the permitting process. The meeting and associated comment period also provides an opportunity to gather input regarding potential impacts and mitigative measures that should be studied in the EA.

On May 14, 2024, the Commission and Commerce issued a joint *Notice of Public Information and Environmental Assessment Scoping Meeting* and associated public comment period.[30] The notice was sent to those individuals on the project contact list and was also available on Commerce's webpage for the project.

Commission and Commerce staff held public information and scoping meetings in Plummer, Minnesota on May 29, 2024, and an online meeting on May 30, 2024. The comment period closed on June 13, 2024. Approximately 15 people attended the Plummer meeting and four attendees provided public comments. There were no public comments at the online meeting.[31] Written comments were received from four labor unions.[32]

Public comments addressed a number of potential impacts and concerns related to the project including setbacks from roads, ditches, and property lines for snow removal; aesthetic impacts; PV panel materials; decommissioning and disposal of PV panels; impacts to nearby recreational activities; and local tax incentives to the community.

Plummer Solar filed comments on June 13, 2024.[33] Plummer Solar responded to public comments regarding potential project setbacks for snow removal, and the potential for PV panels to become damaged.

SCOPING DECISION

The scoping decision identifies the issues studied in this EA.

After considering public comments and recommendations by staff, Commerce issued a scoping decision on July 8, 2024 (**Appendix A**). The scoping decision identifies the issues to be evaluated in this EA.

3.4 Are other permits or approvals required?

Yes, other permits and approvals are required for the project.

A site permit from the Commission is the only state permit required for siting the project. However, various federal, state, and local approvals might be required for activities related to construction and operation of the project. These subsequent permits are referred to as "downstream" permits and

[30] Commission and Commerce *Notice of Public Information and Environmental Review Scoping Meeting*, May 14, 2024, eDocket ID: 20245-206704-01
[31] Oral Comments on the Scope of Environmental Assessment, Public Scoping and Information Meetings, Plummer, Minnesota, May 29, 2024 and virtual meeting, May 30, 2024, eDocket ID: 20246-207968-01.
[32] Written Comments on the Scope of Environmental Assessment, eDocket ID: 20246-207968-02.
[33] Plummer Solar, Comments, June 13, 2024, eDockets: 20246-207663-01

must be obtained by the permittee prior to construction.[34] Table 6 lists potential downstream permits that might be required, several of which are discussed below.

3.4.1 Federal

The U.S. Army Corps of Engineers (USACE) "regulates the discharge of dredged or fill material into waters of the United States, including wetlands."[35] Dredged or fill material, including material that moves from construction sites into these waters, could impact water quality. A permit is required from USACE if the potential for significant adverse impacts exists. The USACE is also charged with coordinating with Indian tribes regarding potential impacts to traditional cultural properties.

The U.S. Environmental Protection Agency (USEPA) enforces the Spill Prevention, Control and Countermeasures Plan (SPCCP). "The purpose of the Spill Prevention, Control, and Countermeasure (SPCC) rule is to help facilities prevent a discharge of oil into navigable waters or adjoining shorelines. The SPCC rule requires facilities to develop, maintain, and implement an oil spill prevention plan, called an SPCC Plan." If a plan is required for this project, it would prevent oil spill, as well as control a spill should one occur. This plan may be required for power transformers witin the project substation.

A permit is required from the U.S. Fish and Wildlife Service (USFWS) for the incidental taking[36] of any threatened or endangered species. As a result, USFWS encourages project proposers to consult with the agency to determine if a project has the potential to impact federally listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Table 6. Potential Downstream Permits

Unit of Government	Type of Application	Purpose	Anticipated for Project
Federal			
U.S. Army Corps of Engineers	Section 404 Clean Water Act – Dredge and Fill	Protects water quality by controlling discharges of dredged and fill material	Possible
U.S. Environmental Protection Agency	Spill Prevention, Control and Countermeasures Plan	Protect facilities with oil storage of more than 1,320 gallons	Possible
U.S. Fish and Wildlife Service	Threatened and Endangered Species Consultation	Consultation to mitigate impacts to federally listed species	Possible
	Nest Removal Permit under Bald and Golden Eagle Protection Act	Required in the event of removal of a bald eagle nest	Possible

[34] DSP (Appendix C), Section 4.5.2 (stating the permittee "shall obtain all required permits for the project and comply with the conditions of those permits").

[35] U.S. Environmental Protection Agency (October 27, 2015) *Section 404 Permit Program*, retrieved from: http://www.epa.gov/cwa-404/section-404-permit-program.

[36] 16 U.S. § 1532(19) (defining "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct).

Unit of Government	Type of Application	Purpose	Anticipated for Project
	Section 10 Endangered Species Incidental Take Permit	Potential impacts on federally endangered or threatened species	Possible
State			
Department of Natural Resources	License to Cross Public Lands and Waters	Prevent impacts associated with crossing public lands and waters	No
	State Threatened and Endangered Species Consultation	Consultation to mitigate impacts to state-listed species	Yes
	Water Appropriation Permit	Balances competing management objectives; may be required for construction dewatering	Possible
	Utility Crossing Liscense	Required to cross state land with utility infrastructure	Possible
Minnesota Pollution Control Agency	Construction Stormwater Permit	Minimizes temporary and permanent impacts from stormwater	Yes
	Section 401 Clean Water Act – Water Quality Certification	Ensures project will comply with state water quality standards	Possible
State Historic Preservation Office	National Historic Preservation Act Section 106 Consultation	Ensures adequate consideration of impacts to significant cultural resources	Yes
Department of Agriculture	Agricultural Impact Mitigation Plan	Establishes measures for protection of agricultural resources	Yes
Department of Labor and Industry	Electrical Inspection	Necessary to comply with electric code.	Yes
Department of Transportation	Utility Accommodation on Trunk Highway ROW Permit	Controls utilities being placed along or across highway rights-of-way (ROW)	No
	Oversize/Overweight Permit	Controls use of roads for oversize or overweight vehicles	Possible
Board of Water and Soil Resources	Wetland Conservation Act	Ensures conservation of wetlands	No
Local			
Red Lake County	Transportation Permit	Required for transporting oversized and overweight loads on County roadways.	Possible
	Access Driveway/Entrance Permit	Required for moving, widening or creation a new driveway access to County roads	Possible

Unit of Government	Type of Application	Purpose	Anticipated for Project
	Drainage and Ditching Work Within County Highway Right-of-Way	Required to work within public roads rights-of-way	Possible
	Grading and filling permit	Required for the movement of more than 10 cubic yards or material within shoreland	Possible
	Permit for Installation of Object/Structures Within County Highway Right-of-Way (Utility Permit)	Required for installation of a utility, tile inlet/outlet, or other object of any kind within the highway right-of-way	Possible
	Individual Sewage Treatment Systems Permit	Required prior to installation of any individual sewage treatment system in Red Lake County	Possible
Red Lake County Soil and Water Conservation District (SWCD)	Minnesota Wetland Conservation Act Approval	Activities affecting water resources	Possible

3.4.2 State

Potential impacts to state lands and waters, as well as fish and wildlife resources, are regulated by the DNR. Licenses are required to cross state lands or waters.[37] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a *Public Waters Work Permit*.[38] Utility infrastructure that will be crossing DNR managed lands require the agency to provide a Utility Crossing License.[39] Not unlike the USFWS, DNR encourages project proposers to consult with the agency to determine if a project has the potential to impact state-listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Construction projects that disturb one or more acres of land require a general *National Pollutant Discharge Elimination System / State Disposal System Construction Stormwater Permit* ("CSW Permit") from the MPCA. This permit is issued to "construction site owners and their operators to prevent stormwater pollution during and after construction."[40] The CSW Permit requires use of best management practices; development of a Stormwater Pollution Prevention Plan; and adequate stormwater treatment capacity once the project is complete. Projects must be designed so that stormwater discharged after construction does not violate state water quality standards. Specifically,

[37] Minnesota Statutes 84.415.

[38] DNR (n.d.) *Requirements for Projects Involving Public Waters Work Permits*, http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.

[39] DNR (2023) *Utility Crossing Liscence,* https://www.dnr.state.mn.us/permits/utility_crossing/index.html

[40] MPCA. *Construction Stormwater*. (2023). https://www.pca.state.mn.us/business-with-us/construction-stormwater

projects with net increases of one acre or more to impervious surface must be designed to treat water volumes of one-inch times the net increase in impervious surface. PV panels are impervious, and are counted towards total impervious surface along with access roads, buildings, etc. The area beneath the panel, however, is pervious if properly vegetated. To account for this, MPCA developed a solar panel calculator that estimates the amount of stormwater retained by PV solar facilities. This amount can be applied as a credit towards the total amount of stormwater treatment needed for a project.[41]

A Clean Water Act Section 401 *Water Quality Certification* from MPCA might also be required. "Section 401 of the Clean Water Act requires any applicant for a federal license or permit to conduct an activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates that the discharge complies the applicable water quality standards."[42] The certification becomes a condition of the federal permit.

Additionally, MPCA regulates generation, handling, and storage of hazardous wastes.

The State Historic Preservation Office (SHPO) is charged with preserving and protecting the state's historic resources. SHPO consults with project proposers and state agencies to identify historic resources to avoid and minimize impacts to these resources.

The Minnesota Department of Agriculture (MDA) ensures the integrity of Minnesota's food supply while protecting the health of its environment and the resources required for food production. MDA assists in the development of agricultural impact mitigation plans that outline necessary steps to avoid and mitigate impacts to agricultural lands.

The Minnesota Department of Labor and Industry requires an electrical inspection as a component of an electrical permit.[43]

A permit from MnDOT is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way.[44] Coordination would be required to construct access roads or driveways from trunk highways.[45] These permits are required to ensure that use of the right-of-way does not interfere with free and safe flow of traffic, among other reasons.[46]

The Board of Water and Soil Resources (BWSR) oversees implementation of Minnesota's *Wetland Conservation Act* (WCA). The WCA is implemented by local units of government.

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[41] MPCA. *Minnesota Stormwater Manual*. (2022). https://www.pca.state.mn.us/water/minnesotas-stormwater-manual.

[42] MPCA. (n.d.) *Clean Water Act Section 401 Water Quality Certifications*, https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications.

[43] MNDLI (n.d.) Electrical Permits, Contractors, https://www.dli.mn.gov/business/electrical-contractors/electrical-permits-contractors.

[44] Minnesota. Rules, Part. 8810.3300, subp. 1.

[45] Mn DOT *Land Management*. (2022). https://www.dot.state.mn.us/utility/forms.html:.

[46] MnDOT. *Utility Accommodation on Trunk Highway Right of Way: Policy OP002.* (2017). http://www.dot.state.mn.us/policy/operations/op002.html.

3.4.3 Local

Red Lake County local permits may be required as a component of this project, including:

- Transportation Permit to transport oversized and overweight loads on county roadways,
- Access Driveway/Entrance Permits in order to move, widen or create a new driveway access to county roads
- Drainage and Ditching Work Within County Highway Right-of Way Permit in order to work within public road rights-of-way
- Grading and Filling Permit for the movement of more than 10 cubic yeards of material within shoreland
- Installation of Object/Structures Within County Highway Right-of-Way (Utility Permit) in order to install a utility within the highway right-of-way
- Individual Sewage Treatment Systems Permit which must be given prior to the installation of any individual sewage treatment system in the County.[47]

Commission site permits preempt local zoning, building, and land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government; however, coordination with local governments may be required for the issues listed below.

- Access/Driveway Coordination may be required to construct access roads or driveways from county or township roads.
- Overwidth Load Coordination may be required to move over-width or heavy loads on county or township roads.
- Road Crossing and Right-of-Way Coordination may be required to cross or occupy county or township road rights-of-way.

3.5 Do electrical codes apply?

Yes, if constructed the project must meet electrical safety code requirements.

The project must meet requirements of the National Electrical Safety Code.[48] These standards are designed to safeguard human health "from hazards arising from the installation, operation, or maintenance of conductors and equipment in electric supply stations and overhead and underground electric supply lines."[49] They also ensure that facilities and all associated structures are built from

[47] Red Lake County, Highway Department Permits and Policies, https://www.co.red-lake.mn.us/index.asp?SEC=6E12A004-2413-429F-A687-B2A726022D17&DE=E779650A-8CF5-4161-B65C-440204A84FB8&Type=B_BASIC, Red Lake County Shoreland Ordance (2018). https://www.co.red-lake.mn.us/vertical/sites/%7B2C807525-C262-4592-9BD4-DF75FE4B01C9%7D/uploads/Red_Lake_County_Shoreland_Ordinance.pdf

[48] *See* Minnesota. Statute. 326B.35; Minn. R. 7826.0300, subp. 1 (requiring utilities to comply with the most recent edition of the National Electric Safety Code when constructing new facilities or reinvesting capital in existing facilities)

[49] IEEE Standards Association (n.d.) *2017 – National Electrical Safety Code Brochure*, retrieved from: https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/nesc_2017_brochure.pdf.

materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided operational maintenance is performed.

3.6 Are any issues outside the scope of this EA?

Yes, the scoping decision identified several issues that will not be studied.

The EA will not address following topics:

- Any site other than the project site proposed by the applicant.
- The manner in which landowners are compensated for the project.

4 Project Impacts and Mitigation

Chapter 4 describes the environmental setting, affected resources, and potential impacts from the project. It also discusses mitigation of potential impacts.

4.1 How are potential impacts measured?

Potential impacts are measured on a qualitative scale based on an expected impact intensity level; the impact intensity level takes mitigation into account.

A potential impact is the anticipated change to an existing condition caused either directly or indirectly by the construction and operation of a proposed project. Potential impacts can be positive or negative, short- or long-term, and, in certain circumstances, can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations.

Direct impacts are caused by the proposed action and occur at the same time and place. An indirect impact is caused by the proposed action but is further removed in distance or occurs later in time. This EA considers direct and indirect impacts that are reasonably foreseeable, which means a reasonable person would anticipate or predict the impact. Cumulative potential effects are the result of the incremental impacts of the proposed action in addition to other projects in the environmentally relevant area.

4.1.1 Potential Impacts and Mitigation

The following terms and concepts are used to describe and analyze potential impacts:

- Duration Impacts vary in length. Short-term impacts are generally associated with construction. Long-term impacts are associated with the operation and usually end with decommissioning and reclamation. Permanent impacts extend beyond the decommissioning stage.
- Size Impacts vary in size. To the extent possible, potential impacts are described quantitatively, for example, the number of impacted acres or the percentage of affected individuals in a population.
- Uniqueness Resources are different. Common resources occur frequently, while uncommon resources are not ordinarily encountered.
- Location Impacts are location dependent. For example, common resources in one location might be uncommon in another.

The context of an impact—in combination with its anticipated on-the-ground effect—is used to determine an impact intensity level, which can range from beneficial to harmful. Impact intensity levels are described using a qualitative scale, which is explained below. These terms are not intended as value judgments, but rather a means to ensure common understanding among readers and to compare potential impacts between alternatives.

- Negligible impacts do not alter an existing resource condition or function and are generally not noticeable to an average observer. These short-term impacts affect common resources.

- Minimal impacts do not considerably alter an existing resource condition or function. Minimal impacts might, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources over the short- or long-term.
- Moderate impacts alter an existing resource condition or function and are generally noticeable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Moderate impacts might be long-term or permanent to common resources, but generally short- to long-term to uncommon resources.
- Significant impacts alter an existing resource condition or function to the extent that the resource is impaired or cannot function. Significant impacts are likely noticeable or predictable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Significant impacts can be of any duration and affect common or uncommon resources.

Also discussed are opportunities to avoid, minimize, or compensate for potential impacts. Collectively, these actions are referred to as mitigation.

- To avoid an impact means to eliminate it altogether, for example, by not undertaking parts or all of a project, or relocating the project.
- To minimize an impact means to limit its intensity, for example, by reducing project size or moving a portion of the project.
- To correct an impact means to repair, rehabilitate, or restore the affected resource.
- To compensate for an impact means replacing it or providing a substitute resource elsewhere, or by fixing it by repairing, rehabilitating, or restoring the affected resource. Compensating an impact can be used when an impact cannot be avoided or further minimized.

Some impacts can be avoided or minimized; some might be unavoidable but can be minimized; others might be unavoidable and unable to be minimized, but compensation can be applied. The level at which an impact can be mitigated might change the impact intensity level.

4.1.2 Regions of Influence

Potential impacts to human and environmental resources are analyzed within specific geographic areas called regions of influence ("ROI"). This EA uses the following ROIs:

- Land control area (land control of the solar generating facility and collection corridors)
- Local vicinity (1,600 feet from the boundary of the solar generating facility)
- Project area (one mile from the boundary of the solar generating facility)
- Region (Red Lake County)

Impacts to resources may extend beyond these distances but are expected to diminish quickly. ROIs vary between resources. Table 7 summarizes the ROIs used in this EA.

Table 7. Regions of Influence for Human and Environmental Resources

Resource Type	Resource Element	Region of Influence
Human Settlement	Displacement, Land Use and Zoning	Land control area
	Noise, Property Values, Tourism	Local vicinity
	Aesthetics, Cultural Values, Recreation, Transportation and Public Services	Project area
	Socioeconomics, Environmental Justice	Region
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Public Safety and Emergency Services	Land control area
Land-based Economies	Agriculture, Forestry, Mining	Land control area
	Tourism	Project area
Archaeological and Historic Resources	—	Project area
Natural Environment	Geology and Groundwater, Soils, Surface Water and Floodplains, Wetlands, Vegetation, Wildlife and Habitat (except birds)	Land control area
	Wildlife and Habitat (birds), Rare and Unique Resources	Local vicinity
	Air Quality	Region

4.2 Project Setting

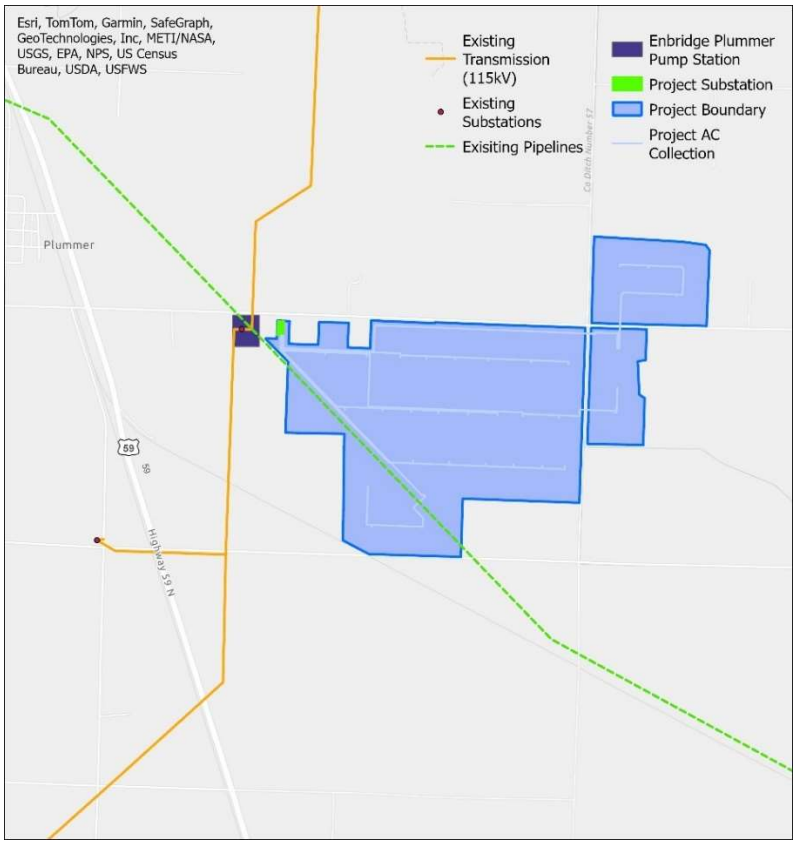
The project is in a rural area, generally east of US Highway 59, south and east of the city of Plummer in Red Lake County. Red Lake County has been slowly decreasing in population, compared to the rest of Minnesota. The project area is dominated by agricultural land uses and scattered farmsteads, with developed areas in Plummer. There is also an existing pump station with associated facilities, a substation, and transmission infrastructure in the project area

The proposed solar facility is located in Emardville township, east and south of the city of Plummer in Red Lake County, Minnesota. The solar facility is east of U.S. Highway 59 (Figure 1). The topography of the project site is relatively flat with gentle slopes. Views are broad but typically bounded by

sections of woodland. Residences in the area are sprinkled across the landscape. Most of the surrounding residences are at least partially surrounded by woodlands or shelterbelts.

The project is in the Lake Agassiz, Aspen Parklands Section (223Na) subsection of the Tallgrass Aspen Parklands Province.[50] Presettlement vegetation consisted of a combination of aspen savanna, tallgrass prairie, wet prairie, and dry gravel prairie (on gravelly beach ridges). Floodplain forests of silver maple, elm, cottonwood, and ash occurred along rivers and streams. The current land-use in the project area is predominately agricultural.

Figure 8. Area Energy Infrastructure



Land use in the project area is predominantly agricultural, but includes developed areas in the city of Plummer and other residential areas, transportation corridors, and commercial and industrial uses, including other energy infrastructure. Land use within the area of land control is dominated by agricultural; approximately 92 percent of the 885 acre land control area is currently used for cultivated agriculture (primarily corn, soybeans, and winter wheat). Built features common to the area include residences and buildings, paved and gravel roads. There are also several energy infrastructure projects in the region, a pump station with associated pipelines, substation and infrastructure, and transmission lines (Figure 8).

[50] DNR (n.d.) *Ecological Classification System: Ecological Land Classification Hierarchy*, retrieved from: https://www.dnr.state.mn.us/ecs/index.html

4.3 Human Settlement

Large energy projects can impact human settlements. Impacts might be short-term, such as increased local expenditures during construction, or long-term, such as changes to viewshed.

4.3.1 Aesthetics

The ROI for aesthetics is the project area. The project will introduce new manmade structures into the existing landscape. Portions of the project will be visible from local roads, and nearby residences. For most people who pass through the project area on US Highway 59 or local roads the impact intensity level is expected to be minimal. For individuals with greater viewer sensitivity, such as people who live in the project area, the impact intensity level is anticipated to be moderate to significant. Impacts will be short- and long-term, and localized. Potential impacts are unavoidable but can be mitigated in part.

Aesthetics refers to the visual quality of an area as perceived by the viewer and forms the impression a viewer has of an area. Aesthetics are subjective, meaning their relative value depends upon the perception and philosophical or psychological responses unique to individuals. Impacts to aesthetics are equally subjective and depend upon the sensitivity and exposure of an individual. How an individual values aesthetics, as well as perceived impacts to a viewshed, can vary greatly.

A viewshed includes the natural landscape and built features visible from a specific location. Natural landscapes can include wetlands, surface waters, distinctive landforms, and vegetation patterns. Buildings, roads, bridges, and power lines are examples of built features.

Viewer exposure refers to variables associated with observing a viewshed, and can include the number of viewers, frequency and duration of views, and view location. For example, a high exposure viewshed would be observed frequently by large numbers of people. These variables, as well as other factors such as viewing angle or time of day, affect the aesthetic impact.

Figure 9. Existing Viewshed of Plummer Solar Project

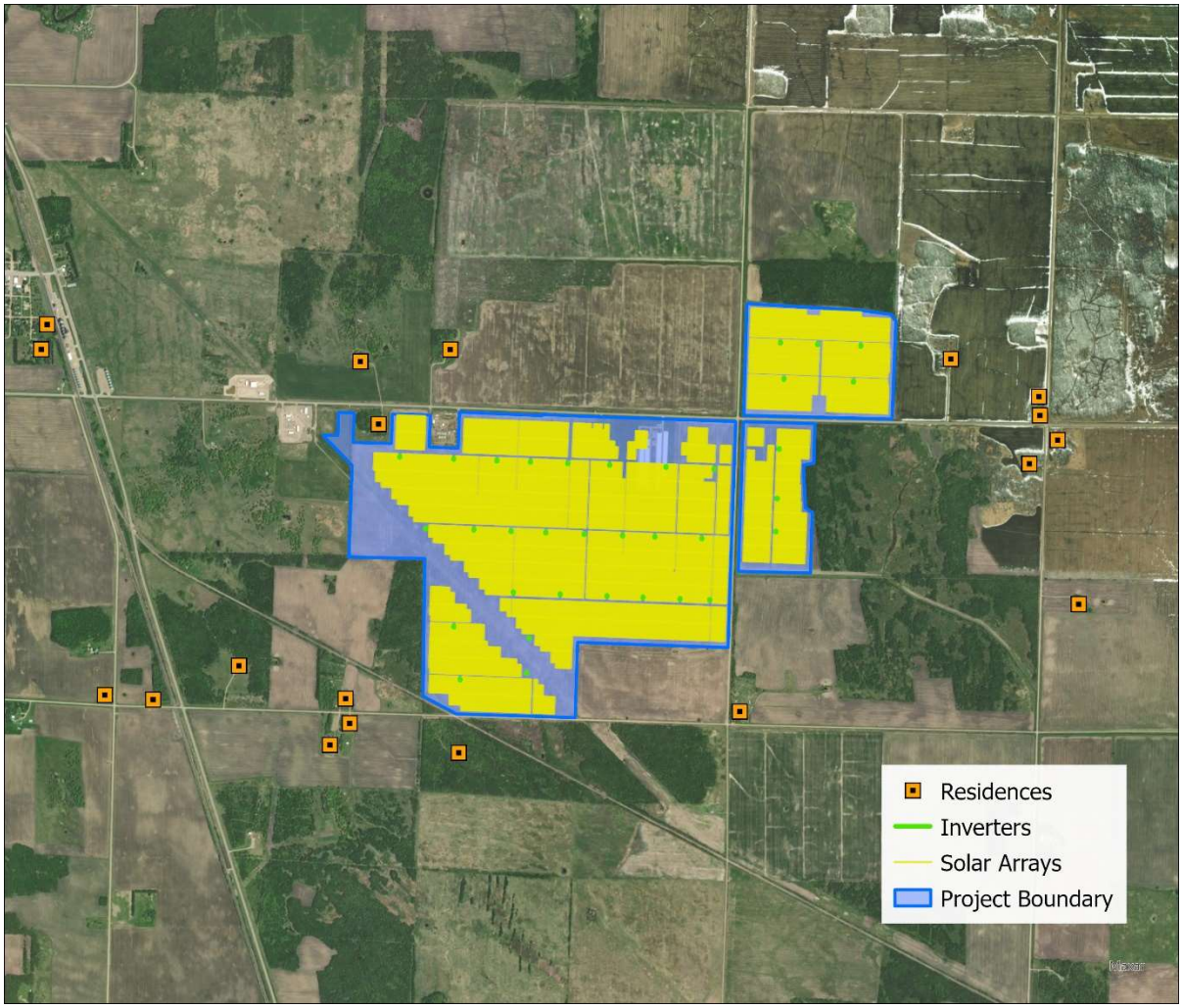
Figure 10. Existing Landscape and Distribution Line Near Plummer Solar Project

The existing landscape in the project is area is rural and agricultural consisting of generally flat terrain, dominated by agricultural crop fields of corn, soybeans, and winter wheat, with the surrounding area also supporting a variety of woodlands, wetlands and drainages. Figure 9 shows the existing viewshed of the area off of 180th Street SE facing south towards the project location. Figure 10 shows the view of existing electric distribution lines along the project area.

The built environment in the project area includes the city of Plummer northwest of the project, a commercial business adjacent to the site, several grain storage facilities and township and city roads. Existing infrastructure includes a transmission line, pump station, electrical substation, and underground pipelines. Residences and farmsteads are scattered around the nearby landscape, mostly surrounded by woodlands or shelterbelts. As shown in Figure 11, there are no residences or businesses within the area of Land Control; however, there are 19 residences within one mile of the project site. The nearest home to the solar facility is located on the south side of 180th Street SE, approximately 232 feet from the project boundary line, 320 feet from the nearest solar array and 651 feet away from the nearest inverter.[51]

[51] SPA, p. 42

Figure 11. Residences within Local Area



4.3.1.1 POTENTIAL IMPACTS

The visible elements of the solar facility will consist of new PV arrays, transofrmers and inverters, up to seven weather stations, an O&M facility, a new substation and a short transmission line, and security fencing surrounding the project.

The project will be a noticeable change in the landscape, converting approximately 769.9 acres of agricultural fields into solar production. Although the change will be noticeable, there are other existing infrastructure features in the landscape including gravel roads, transmission and distribution lines, and substations. The project will be immediately adjacent to an existing substation and pump station facilities that have long operated in the area. How an individual viewer perceives the change from a field of corn to a field of solar panels depends, in part, on how a viewer perceives solar panels. Will the viewer consider the harvesting of solar energy to be like harvesting crops or will the viewer see an agricultural use be replaced by an industrial use?

For residents outside the project vicinity and for others with low viewer sensitivity, such as travelers along U.S. Highway 59 N, aesthetic impacts are anticipated to be minimal. For these viewers, the solar panels would be relatively difficult to see due to fencing and vegetation, or would be visible for a very short period. For residents in the project vicinity and for others with high viewer sensitivity traveling on local roads in the project vicinity, such as 180th Street SE, aesthetic impacts are anticipated to be moderate to significant.

Current fields of corn, soybeans, and winter wheat will be replaced with acres of solar panels. Panels will have a relatively low profile, when level to the ground they will be 5 to 8 feet tall, with a maximum height of 9-12 feet off the ground at maximum tilt.[52] Construction of the new 1.3 acre project substation, the associated transmission line and the 1 acre O&M facility will also present new visual impacts. The collector pole and dead-end structure will support aboveground conductors within the substation and is expected to be approxomately 95 feet tall, depending on final design. The O&M facility will include a SCADA system an area for maintaining and storing equipment and a parking lot. The project's 115 kV transmission line will be a short line, less than 1,500 feet in length. The nearest residence is approximately 500 feet from the project transmission line. In addition, an existing 115 kV transmission line is presently located adjacent to the project area.

PV panels are designed to absorb light to convert the light to electricity. Compared to clear glass, which typically reflects approximately eight percent of the sunlight, PV panels typically reflect approximately three percent of the sunlight when the panels are directly facing the sun.

Down-lit security lighting will be installed at the gates to the facility as well as outside the O&M facility and project substation, and along the perimeter fence as necessary for safety and security. Lighting will be motion-activated and down lit to minimize impacts and effects.[53] Impacts to light-sensitive land uses are not anticipated given the rural project location coupled with minimal required lighting for operations.

MITIGATION

Minimizing aesthetic impacts from solar generating facilities is primarily accomplished by locating the facilities so that they are not immediately adjacent to homes, ensuring that damage to natural landscapes during construction is minimized, and shielding the facilities from view by terrain or vegetation. Impacts from facility lighting can be minimized by using shielded and downward facing light fixtures and using lights that minimizes blue hue.

Impacts can be mitigated through standard or special permit conditions. A draft site permit (DSP) for the Project is included in **Appendix C**. Section 4.3.8 of the DSP is a standard condition that requires the permittee to consider landowner input with respect to visual impacts and to use care to preserve the natural landscape.

Site-specific landscaping plans can minimize visual impacts to adjacent land uses and homes through vegetation screening, berms, or fencing. Plummer Solar indicates that although nearby residences have some natural vegetation screening from the project, further discussion with affected landowners

[52] SPA, p. 21
[53] SPA, p. 24

is in progress. Plummer Solar will work with adjacent landowners to determine the need for additional vegetation screening and landscaping to minimize aesthetic impacts of the project.

Aesthetic impacts can also be mitigated through individual agreements with neighboring landowners (sometimes referred to as good neighbor agreements). Such agreements are not within the scope of this EA.

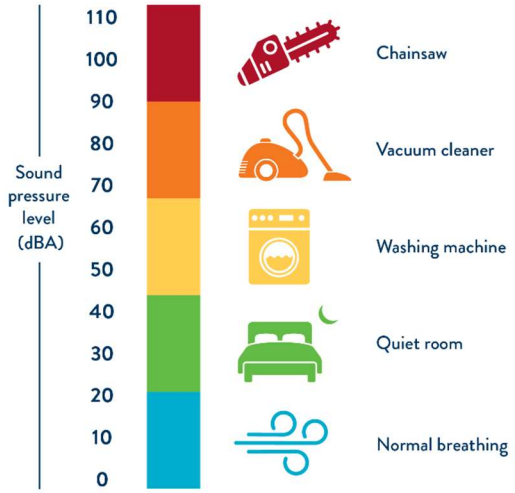
4.3.2 Noise

The ROI for noise is the local vicinity. Distinct noises are associated with the different phases of project construction. The impact intensity level during construction will range from negligible to significant depending on the activity. Potential impacts are anticipated to be intermittent and short-term. These localized impacts may affect nearby residences and might exceed state noise standards. Impacts are unavoidable but can be minimized. Operational impacts are anticipated to be negligible.

Noise can be defined as any undesired sound. It is measured in units of decibels on a logarithmic scale. The A-weighted scale ("dBA") is used to duplicate the sensitivity of the human ear.[54] A three dBA change in sound is barely detectable to average human hearing, whereas a five dBA change is clearly noticeable. A 10 dBA change is perceived as a sound doubling in loudness. Noise perception is dependent on a number of factors, including wind speed, wind direction, humidity, and natural and built features between the noise source and the receptor.

Figure 12 provides decibel levels for common indoor and outdoor activities.[55]

Figure 12. Common Noise Levels



In Minnesota, noise standards are based on *noise area classifications* ("NAC") corresponding to the location of the listener, referred to as a receptor. NACs are assigned to areas based on the type of land use activity occurring at that location. Household units, designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3.

Noise standards are expressed as a range of permissible dBA over a one-hour period. L_{10} may be exceeded 10 percent of the time, or six minutes per hour, while L_{50} may be exceeded 50 percent of the time, or 30 minutes per hour. Standards vary between daytime and nighttime hours. There is no

[54] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.

[55] Federal Aviation Administration (February 9, 2018) *Fundamentals of Noise and Sound*, retrieved from: https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/.

limit to the maximum loudness of a noise. Table 8 provides current Minnesota noise standards.

Table 8. Noise Area Classifications (dBA)

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

The MPCA noise standards are public health standards. That is, they protect people from noise generated by all sources at a specific time and place. The total sum of noise at a specific time and location cannot exceed the standards. The MPCA evaluates whether a specific noise source is in violation by determining if the source causes or significantly contributes to a violation of the standards.

Potential Impacts

The primary noise receptors are the local residences. Although there are no residences within the site, there are 19 residences in local proximity (within one mile)[56]. The proposed project is in a rural, agriculturally dominated area. Rural residential areas have a typical daytime noise level of 40 dBA and a typical nighttime level of 34 dBA.[57] Residences are in NAC 1. Noise receptors could also include individuals working outside in the project vicinity. Potential noise impacts from the project are associated with construction noise and operational noise.

Construction

Noise from construction will be temporary on duration, limited to daytime hours and potentially moderate to significant depending on location. Sound levels from grading equipment are not dissimilar from the typical tractors and larger trucks used in agricultural communities during harvest. Pile driving of the rack supports will be the most significant source of construction noise, or the helical pile equipment if the applicant decides to use helical piles.

Federal Highway Administration Construction guidance was used to estimate the noise from power hammers to be approxomately 90 dBA at 50 feet (the minimum setback from neighboring property lines).[58] Scaled to daytime noise level standards, this corresponds to NAC-1 compliant levels at 800 feet, and most residences are further than this from the project area. The noise from construction activities would dissipate with distance and be audible at varying decibels, depending on the locations of the equipment and receptor.

[56] SPA, Appendix E. Landowner List and Map.
[57] SPA, pp. 38-39.
[58] SPA, p. 39.

Thus, this construction noise would likely exceed state noise standards at select times and locations. Exceedances would be short-term and confined to daytime hours. Even without an exceedance, noise impacts will occur. Rhythmic pounding of foundations posts would be disruptive even if the noise associated with that activity is within state standards. If the applicant elects to install a helical pile based on conditions at the site, the installation would take longer but would be quieter.

Other construction activities, for example, installation of solar panels, are anticipated to have minimal noise impacts. A forklift is typically used to place solar panels on the racking system. Construction activities will be sequenced, that is, site grading may occur at one location while posting driving occurs at another location while racking and panel assembly might occur at another location, at the same time.

Operation

Noise levels during operation of the project are anticipated to be negligible. The primary source of noise from the solar facility will be from inverters and transformers, although some minor noise may be generated from the short transmission line. Noise levels are expected to be constant throughout the day and lower during non-daylight hours. For residential areas, there is an expected maximum level of 44 dBA within 320 feet, the distance of the nearest home to an inverter, well below the daytime L_{50} dBA noise standard of 60 dBA and the nighttime standard of 50 dBA.[59] Noise from routine maintenance activities is anticipated to be negligible to minimal. Noise from the electrical collection system is not expected to be perceptible.

MITIGATION

Sound control devices on vehicles and equipment (e.g., mufflers), conducting construction activities during daylight hours, and running vehicles and equipment only when necessary are common ways to mitigate noise impacts. Plummer Solar also indicated that they may elect to erect temporary mobile noise barriers adjacent to installations to reduce impacts.

Section 4.3.7 of the proposed DSP (**Appendix C**) is a standard condition that requires the permittee to comply with noise standards established under Minnesota noise standards as defined under Minnesota Rule, part 7030.010 to 7030.0080, and to limit construction and maintenance activities to daytime hours to the extent practicable. No additional mitigation is proposed.

4.3.3 Cultural Values

The ROI for cultural values is the project area. Development of the project will change the character of the area, potentially changing residents' sense of place. There are tradeoffs for rural communities between renewable energy projects and retaining the rural character of an area. Construction and operation of the project is not anticipated to impact or alter the work and leisure pursuits of residents in the project area in such a way as to impact the underlying culture of the area.

Cultural values can be defined as shared community beliefs or attitudes that define what is collectively important to the group. These values provide a framework for individuals and community thought and action. Infrastructure projects believed inconsistent with these values can deteriorate community

[59] SPA, p. 40.

character. Those found consistent with these values can strengthen it. Projects often invoke varying reactions and can, at times, weaken community unity.

Individual and community-based renewable energy is becoming more valued across the nation. Utility scale renewable projects—generally located far from load centers in rural areas—are also valued, but, at times, opposed by residents. The highly visible, industrial look and feel of these projects can erode the rural feeling that is part of a residents' sense of place.

Cultural values can be informed by ethnic heritage. Residents of Red Lake County derive primarily from Native American, French Canadian, and European ancestry. Cultural values are also informed by work and leisure pursuits, for example, farming and snowmobiling, as well as land use, such as agricultural cropland. Community events in the project area are usually tied to seasonal/municipal events, and national holidays.

POTENTIAL IMPACTS

The project contributes to the growth of renewable energy and is likely to strengthen and reinforce this value in the area. At the same time, the development of the project will change the character of the area. The value residents put on the character of the landscape within which they live is subjective, meaning its relative value depends upon the perception and philosophical or psychological responses unique to individuals. Because of this, construction of the project might—for some residents—change their perception of the area's character thus potentially eroding their sense of place.

MITIGATION

There are no conditions included in the DSP that directly address mitigation for impacts to cultural values. Section 4.3.24 addresses impacts to cultural properties. No additional mitigation is proposed.

4.3.4 Land Use and Zoning

The ROI for land use and zoning is the land control area. The impact intensity level is anticipated to be moderate due to the conversion of agricultural land to land used for energy generation. Land use impacts are anticipated to be long-term and localized. Constructing the project will change land use from agricultural to solar energy production for a minimum of 30 years. After the project's useful life, the land control area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. Impacts can be minimized by using best practices to protect land and water quality.

The National Land Cover Database provides "spatial reference and descriptive data for characteristics of the land surface" nationwide.[60] The solar facility is located in the As shown in Table 9, the project land cover is dominated by cultivated agriculture, with scattered areas of wetlands and developed areas around farmsteads.

Land use is the characterization of land based on what can be built on it and how the land is used. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. Land cover documents how much of a region is

[60] U.S. Geological Survey. *The National Land Cover Database (NLDC) 2019 Products (ver 3.0)*. (February 2024), retrieved from: https://www.usgs.gov/data/national-land-cover-database-nlcd-2019-products-ver-30-february-2024#publications.

covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types, including wetlands. Construction of solar generating facilities and transmission line will alter current and future land use and land cover.

Table 9. Land Cover

Category	Land Control Area (Acres)	Percentage
Developed, Open Space	11.96	1.4%
Developed, Low Density	5.06	0.6%
Developed, Medium Density	5.29	0.6%
Developed, High Density	5.98	0.7%
Emergent Herbaceous Wetlands	30.59	3.5%
Woody Wetlands	1.84	0.2%
Deciduous Forest	1.61	0.2%
Hay/Pasture	1.38	0.2%
Cultivated Crops	821.33	92.8%
Total	**885.04**	100%

A site permit from the Commission supersedes local zoning, building, or land use rules.[61] Though zoning and land use rules are superseded, the Commission's site permit decision must be guided, in part, by consideration of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts."[62]

The area of land control is located within Emardville Township in Red Lake County. Red Lake County does not have a zoning ordinance. Red Lake County setbacks from roads, ditches, and property lines are applicable to this project. Red Lake County has a Shoreland Ordinance which covers shorelands of public water bodies. This will not be applicable as there are no public water bodies within the Land Control area of the project.

Red Lake County has a Comprehensive Local Water Management Plan created by the Red Lake County Soil & Water Conservation District, which focuses on water and related land resource issues within the entire county. The following are listed as priority concerns to address by protecting water resources: surface water quality and impaired waters; quantity of water moving through the county; ground water quality; erosion and sedimentation, recreational opportunities, and continuation of ongiong District activities.[63] The applicant has stated that they reviewed this plan and intend to follow best practices in protecting priority concerns for this plan as feasible.

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[61] Minnesota Statutes 216E.10, subd. 1.
[62] Minnesota Statutes 216E.03, subd. 7.
[63] Red Lake County Soil & Water Conservation District, *Red Lake County Comprehensive Local Water Management Plan* (2010), retrieved from https://www.usgs.gov/data/national-land-cover-database-nlcd-2019-products-ver-30-february-2024#publications.

POTENTIAL IMPACTS

Development of a solar farm in this area will temporarily change the land use from predominantly agricultural uses to energy generation for the life of the project. The change of land use will have a minimal to moderate impact on the rural character of the surrounding area, and a minimal impact on the county character as a whole. Although the land is being converted from primarily agricultural to be used for energy production, the land use is consistent with other infrastructure in the area such as existing transmission lines and the adjacent pump station.

Plummer Solar states that it will apply the structure setback to its facilities in a manner consistent with Red Lake County setback requirements. The project will not impact any public waters, therefore is not under jurisdiction of the county Shoreland Ordindance. There may be minimal and temporary impacts to water sources due to construction near wetlands, where the applicant must enlist best practice to protect priority concerns under the Red Lake County Local Water Mangement Plan.

MITIGATION

The project would convert approximately 884 acres of cultivated cropland to solar energy production. Plummer Solar intends to utilize best practices as feasible to reduce the impact on land use and water resources in congruance with the Red Lake County Comprehensive Local Water Mangement Plan. Although the project is subject to oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, Plummer Solar will continue to coordinate with Red Lake County and Emardville Township on other potential permits for the project.

The DSP (**Appendix C**) has several permit conditions related to the preservation and restoration of agricultural land:

- Section 4.3.17 requires the applicant to prepare a vegetation management plan to prevent soil erosion and invests in soil health by establishing a plan to protect soil resources by ensuring perennial cover. The applicant's draft VMP is found in Appendix H of the site permit application.
- Section 4.3.18 requires the applicant to prepare an AIMP that details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use. The applicant's draft AIMP is found in Appendix G of the site permit application.
- Section 9 requires the applicant to prepare a decommissioning plan focused on returning the project site to agricultural use at the end of the project's useful life. The applicant's draft decommissioning plan is found in Appendix I of the site permit application.
- Section 9.2 requires removal of all project-related infrastructure.

4.3.5 Property Values

The ROI for property values is the local vicinity. Impacts to property values within the local vicinity could occur; however, changes to a specific property's value are difficult to determine. Because of this uncertainty, impacts to specific properties in the project vicinity could be minimal to moderate and decrease with distance and over time.

Impacts to property values can be measured in three ways: sale price, sales volume, and marketing time. These measures are influenced by a complex interaction of factors. Many of these factors are parcel specific, and can include condition, size, acreage, improvements, and neighborhood characteristics; the proximity to schools, parks, and other amenities; and the presence of existing infrastructure, for example, highways or transmission lines. In addition to property-specific factors, local and national market trends, as well as interest rates, can affect all three measures. The presence of a solar facility becomes one of many interacting factors that could affect a specific property's value.

Because each landowner has a unique relationship and sense of value associated with their property a landowner's assessment of potential impacts to their property's value is often a deeply personal comparison of the property "before" and "after" a proposed project is constructed. The landowner's judgments, however, do not necessarily influence the market value of a property. Professional property appraisers assess a property's value by looking at the property "after" a project is constructed. Moreover, potential market participants are likely to see the property independent of the changes brought about by a project; therefore, they do not take the "before" and "after" into account the same way a current landowner might. Staff acknowledges this section does not and cannot consider or address the fear and anxiety felt by landowners when facing the potential for negative impacts to their property's value.[64]

Electrical generating facilities can impact property values. Often, negative effects result from impacts that extend beyond the project location. Examples include emissions, noise, and visual impacts. Unlike fossil-fueled electric generating facilities, the project would not generate emissions. Potential impacts from operational noise are not anticipated. Aesthetic impacts will occur, but because the project is relatively low in height – as compared to a wind turbine or a smokestack – impacts would be localized.

Large solar facilities exist in Minnesota; however, limited sales information is available. A review of the literature identified one peer-reviewed journal article that addressed impacts to property values based on proximity to utility-scale, PV solar facilities. The Lawrence Berkeley National Lab studied over 1,500 large-scale PV solar facilities in six states (including Minnesota) to determine whether home sale prices were influenced within 0.5 miles (from over 1.8 million home sale transactions).[65] In summary, the study found that effects, "on home sale prices depend on many factors that are not uniform across all solar developments or across all states."

In Minnesota in particular, the study found that homes within one-half mile of large-scale PV solar facilities had a 4 percent reduction in home sale prices compared to homes 2-4 miles away. This finding was considered statistically significant. Additionally, only large-scale PV solar facilities developed on previously agricultural land, near homes in rural areas, and larger facilities (roughly 12 acres or more) were found to be linked to adverse home sale price impacts within one-half mile. The

[64] This paragraph is based, in part, on the following: Chalmers, James (October 30, 2019) *High Voltage Transmission Lines and Residential Property Values in New England PowerPoint Presentation*, retrieved from: https://www.nhmunicipal.org/sites/default/files/uploads/Annual_Conference/2019/Sessions/Wednesday/market_effects_of_utility_rows_presentation-1045am.pdf ; Department of Commerce (August 5, 2014) *Rights-of-way and Easements for Energy Facility Construction and Operation*, retrieved from: https://mn.gov/Commerce/energyfacilities/.

[65] Shedding light on large-scale solar impacts, March 2023. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0301421523000101 .

analysis did not include consideration of site features or site design, for example setbacks or landscaping features, which could play a role in nearby property valuation. Another limitation of the study was the lack of examination of the broader economic impacts or benefits to host communities from large-scale PV solar facilities, which might positively impact home sale prices.

Other studies with smaller sample sizes did not find a consistent negative impact to the sales value of properties near large solar facilities. Chisago County Environmental Services and Zoning found that home sales exceeded assessed value near the 100 MW North Star solar facility at a rate comparable to the general real estate market in the area.[66] Additionally, a study prepared by CohnReznick examined compared sale prices of properties near 10 existing large solar facilities (including the North Star project) with comparable properties, and did not find a consistent negative impact to the sales value of properties near large solar facilities.[67]

POTENTIAL IMPACTS

Impacts to the value of specific properties within the project vicinity are difficult to determine but could occur. Considerations such as setbacks, benefits to the community, economic impact, and vegetative screening could have an unpredictable range of influence over property value. Several, but not all, of the closest residents have some screening from the Project.

Based on analysis of other utility-scale solar projects, minimal to moderate property value impacts could occur, but significant negative impacts to property values in the project vicinity are not anticipated. To the extent that negative impacts do occur they are expected to be within one-half mile of the solar facility and to decrease with distance from the project and with time. Aesthetic impacts that might affect property values would be limited to residences and parcels in the project vicinity where the solar panels are easily visible.

MITIGATION

Impacts to property values can be mitigated by reducing aesthetic impacts and strains to future land use. Impacts can also be mitigated by Plummer Solar through individual agreements with neighboring landowners, such as a visual screening plan.

4.3.6 Tourism and Recreation

The ROI for tourism is the local vicinity and the ROI for recreation is the project area. Potential impacts to recreational opportunities and tourism are anticipated to be minimal. During construction, unavoidable short-term impacts will occur as construction equipment and vehicle traffic will create noise, dust, and visual impacts. These impacts will be intermittent and localized. There are no anticipated long term impacts from this project.

In 2022, the leisure and hospitality industry in Red Lake County accounted for about $2,475,055 in gross sales, and 95 private sector jobs.[68] Tourism in the project area is largely related to recreational

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[66] Kurt Schneider, Environmental Services Director, (October 20, 2017) *Email to Commerce staff*.

[67] Patricia L. McGarr, Andrew R. Lines, Sonia K. Singh. Real Estate Adjacent Property Value Impact Report: Research and Analysis of Existing Solar Facilities, Published Studies, and Market Participant and Assessor \

[68] Explore Minnesota (n.d.) *2022 Leisure & Hospitality Industry Data*, retrieved from: https://mn.gov/tourism-industry/assets/24-suitcase-sheet-couty-data_8.5x11_tcm1135-607260.pdf

activities including hunting, wildlife viewing and snowmobiling. Activities in the project area are associated with, wildlife management areas (WMAs), snowmobile trails, and county and city parks.

Impacts to tourism and recreation can be direct or indirect. Direct impacts are impacts that directly impede the use of a recreational resource, for example, closing of a trail to facilitate project construction. Indirect impacts reduce the enjoyment of a recreational resources but do not prevent use, for example, aesthetic impacts visible from a scenic overlook.

There are no WMAs, public water access sites, or state parks within one mile of the project area. The nearest WMA is the Emardville WMA, located approximately 2 miles north of the project. The Oriniak and Gervais WMAs are located approximately 5 miles from the project. There are a few local parks, including Omar Sundrug Memorial Park approximately 7 miles southeast in the City of Oklee, and Sportsman Park, Riverside Park, and Voyageur's View Campground located in the City of Red Lake Falls located approximately 12 miles west of the project. There is also a private hunting company located approximately one mile south of the project.

There is one state snowmobile trail less than one mile west of the project area, the Riverland snowmobile trail which follows Highway 59.

Potential Impacts

Impacts to tourism and recreation are anticipated to be minimal and temporary. Due to construction, there will be short-term increases in traffic and noise that could potentially impact recreational activities in close proximity to the project area, including visitors at the snowmobile trail and the private hunting company. However, impacts will be temporary. No significant long term impacts to recreational activities are anticipated.

Mitigation

Because impacts to recreational activities are anticipated to be minimal and temporary, no additional mitigation measures are proposed.

Plummer Solar has indicated that perimeter fencing will be installed following the DNR's Commercial Solar Siting Guidance in order to mitigate disruption to local animal populations, avoiding impacts to recreational activites associated with wildlife such as hunting and wildlife viewing.[69]

4.3.7 Transportation and Public Services

The ROI for transportation and public services is the project area. Potential impacts to the electrical grid, roads and railroads, and other utilities are anticipated to be short-term, intermittent, and localized during construction. Impacts to water (wells and septic systems) are not expected to occur. Overall, construction-related impacts are expected to be minimal, and are associated with possible traffic delays. During operation, negligible traffic increases would occur for maintenance. Impacts are unavoidable but can be minimized.

Public services are services provided by a governmental entity or by a regulated private entity to provide for public health, safety, and welfare.

[69] SPA, p. 57

Water and Wastewater Most residents in the surrounding area have private septic systems, however, the City of Plummer offers municipal water to its residents. Domestic wells are also common in the area.

Electric Utilities The primary electric provider in the project area is Otter Tale Power (OTP), which provides electricity to the City of Plummer, and Red Lake Electric Coop, which distributes the power to the surrounding area. As shown in Figure 8, there is an existing 11kV transmission line to the west of the project area, where the project is intended to interconnect at the northwest boundary. There is also an existing 69 kV transmission line further west outside of the project area.

In addition to the high voltage transmission lines, there are lower voltage electric distribution lines throughout the project area.

Pipelines An existing pipeline corridor runs through the project area, coming into the area from the City of Plummer, crossing the site diagonally from the northwestern corner to the center of the southern boundary, and continuing south onwards. This is an active Enbridge-owned pipeline that transports crude oil. The project is designed to avoid the pipeline ROW, with the exception of the electrical collection system, which will run along the ROW of the pipeline, crossing underneath the pipeline at one location in the southwestern area of the project.

Roads The major roadways accessing the project area are U.S. Highway 59, which runs north-south approximately 0.7 miles to the west of the project area. On the northern border of the project is CSAH 1 (180th Street SE), running west to south is Township Road 190 Street SE, and running north is Township road 230th Ave SE. Access to the project would primarily occur via CSAH 1 (180th Street SE).

Railroads There are no railroads located within the project area, however, a Canadian Pacific railroad line is located immediately south of the project.

Airports There are no FAA-registered airports located in the project area. There are two operating public-use airports or heliports in the vicinity. The nearest FAA-registered airports are the Red Lake Falls Municipal Aiport, which operates one asphalt runway and is located approximately 12.6 miles southwest of the project, and Thief River Falls Regional Airport, which operates two asphalt runways and is located approximately 13.6 miles northwest of the project. In order to assure safety, both the FAA and MnDOT office of Aeronautics have established guidelines for the location of structures near airports. The FAA has height restrictions for development near public airports and guidelines for placement of buildings and other structures near high frequency omnidirectional range navigation systems. MnDOT has zoning areas around public airports that restrict the area where buildings and other structures can be placed.

Potential Impacts

Large energy projects can impact public services, such as buried utilities or roads. These impacts are usually temporary, for example, road congestion associated with material deliveries. Impacts can be long-term if they change the area in a way that precludes or limits public services.

Water and Wastewater Plummer Solar does not anticipate impacts to water and wastewater systems, as there are no wells located within the project area. A single domestic-sized water well will be required for the O&M facility, and because of this a well construction permit will be required from the Minnesota Department of Health (MDH).

Roads During construction workers and trucks delivering construction material and equipment will use the existing state, county, and township road system to access the project. Traffic during construction is estimated to be approximately 20 – 100 pickup trucks, cars, and/or other types of employee vehicles onsite during active construction (12-18 months). Approximately 10 – 20 semi-trucks per day will be used for delivery of facility components. Construction traffic will be perceptible to area residents, but because the average daily traffic on the area is well below design capacity, this increased traffic 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. Plummer Solar indicates that the may power transformer may qualify as an overweight load. If required, Plummer Solar will obtain appropriate approvals for these loads prior to construction. [70]

With the exception of minor field access or driveway changes, no changes to the existing public roads are anticipated.[71]

No impacts to roads are anticipated during the operation; negligible traffic increases would occur for maintenance.

Railroads No impacts to railroads are anticipated as there are no railroads within the project area.

Electric Utilities No long-term impacts to utilities will occur because of the project. The Project will not impact existing transmission lines, althought Plummer Solar indicates that there may be limited, temporary impacts to electrical service during interconnection. These impacts are expected to be short-term, and Plummer Solar indicates that coordination with local individuals and utilities impacted would take place prior to shutdowns.

Pipelines The project crosses an existing pipeline corridor, running from the City of Plummer, crossing the site diagonally from the northwestern corner to the center of the southern boundary, and continuing south onwards. This is an active Enbridge-owned pipeline that transports crude oil. Plummer Solar indicates that electrical cabling will run alongside the pipeline ROW, crossing underneath the pipeline at one location in the southwest area of the project.

Air Safety The applicant used the FAA's Notice Criteria Tool to determine if further aeronautical study or FAA filing is needed. The tool generated a "no notice required" for all components of the project, including solar panels, construction cranes up to 150 ft. in height, electric transmission poles/towers up to 150 ft., or communications towers up to 150 ft. As a result, no further FAA studies or filings are necessary for the project.

MITIGATION

Water and Wastewater Plummer Solar indicates that final project design will avoid impacts to underground and overhead utilities, and underground utilities will be marked prior to construction start. A well construction permit from the Minnesota Department of Health (MDH) would be required if a well is installed at the facility in the future.

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[70] SPA, p. 61
[71] Id.

Utilities Section 4.3.5 of the DSP (**Appendix C**) is a standard permit condition that requires the permittee to minimize disruptions to public utilities.

Impacts to electrical infrastructure that cross the project can be mitigated by appropriate coordination with the owners of the existing infrastructure and following industry best practices.

The location of underground utilities can be identified using the Gopher State One Call system during engineering surveys and marking the underground utility locations prior to construction. If a utility is identified, the project component or the utility itself might need to be relocated if it cannot be successfully crossed. Relocation, as well as any necessary crossing, would need to be coordinated with the affected utility.

Roads Changes or additions to driveways from county roads will require permits from the county.

Section 4.3.22 of the DSP requires permittees to inform road authorities of roads that will be used during construction and acquire necessary permits and approvals for oversize and overweight loads. Permitted fencing and vegetative screening cannot interfere with road maintenance activities, and the least number of access roads shall be constructed.

In addition to permit requirements for driveway access and the conditions of the draft site permit, the following practices can mitigate potential impacts:

- Pilot vehicles can accompany movement of heavy equipment.
- Deliveries can be timed to avoid traffic congestion and dangerous situations on the roadway.
- Traffic control barriers and warning devices can be used as necessary.
- Photographs can be taken prior to construction to identify pre-existing conditions. Permittees would be required to repair any damaged roads to preconstruction conditions.

Pipelines Plummer Solar should take extra measure during underground cable trenching and installation to ensure cabling is at a depth that avoids disturbance to the existing pipeline ROW.

4.3.8 Socioeconomics

The ROI for socioeconomics is the region. The impact intensity level is anticipated to be minimal to significant and positive. Effects associated with construction will, overall, be short-term and minimal. Significant positive effects may occur for individuals. Impacts from operation will be long-term and significant. Adverse impacts are not anticipated.

Red Lake County is growing slower than Minnesota as a whole; between 2010 and 2020, the population in Red Lake County decreased by 3.8 percent, compared to a growth of 7.6 percent for Minnesota as a whole. From 2010 to 2020 the population of the Emardville Township increased by 6.7 percent, however population of the City of Plummer decreased by 5.5 percent over the same time period. Red Lake County, Emardville Township and the City of Plummer all have a lower minority population than the state as a whole. Red Lake County and the City of Plummer have lower median household incomes than the state, however Emardville Township has a higher median household income compared to the state as a whole. (Table 10).

In 2022, the sectors with the largest employment in Red Lake County were retail trade (11.3 percent), transportation and warehousing (9.0 percent) and public administration (8.4 percent).[72] Red Lake County is part of the Minnesota Department of Economic Development Region 1, which is located in the Northwest Planning Region. Unemployment rates fluctuate with the economy, but the unemployment rate for Region 1 has typically been higher than Minnesota's unemployment rate.[73] In 2023, Red Lake County had a slightly higher unemployment rate (3.8%) than the state average (2.7 %). The county also had a lower labor force participation rate (65.1) than Minnesota as a whole (68.7%).[74]

Table 10. Population Characteristics

Area	Total Population				Population Characteristics***		
	2010 Census*	2020 Census*	% Change 2010 - 2020	2022 Estimate **	% Minority‡	Median Household Income ($)	% Below Poverty Level
Minnesota	5,310,584	5,706,494	7.5	5,801,769	22.3	84,313	9.3
Red Lake County	4,089	3,935	-3.8	3,998	8.9	73,889	9.3
Plummer City	292	276	-5.5	281	11.4	78,750	4.9
Emardville Township	195	209	6.7	214	5.7	90,313	3.9

* U.S. Census Bureau, https://data.census.gov/

** 2022, Minnesota State Demographic Center, Population Data, Our Estimates, https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/

*** 2022 American Community Survey 5-year estimates

‡ Minority population includes all persons who do not self-identify as white alone.

Potential Impacts

The impact intensity level is anticipated to be positive. Potential impacts associated with construction will be positive, but minimal and short-term. Significant positive effects might occur for individuals. Impacts from operation will be long-term, positive, and moderate. The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority

[72] American Community Survey, 2022

[73] Minnesota Department of Economic Employment and Development (DEED). *Economic Development Region Profile, Red Lake County 2023 Regional Profile*. (2022), https://mn.gov/deed/assets/060624_redlake_tcm1045-407503.pdf.

[74] DEED. County Profiles for Red Lake County. (2023) https://mn.gov/deed/assets/060624_redlake_tcm1045-407503.pdf.

populations (see discussion of environmental justice in Section 0). Adverse impacts are not anticipated.

Construction of the project is likely to result in increased expenditures for lodging, food and fuel, transportation, and general supplies at local businesses during construction. Construction of the project will create local job opportunities for various trade professionals, and will also generate and circulate income throughought the community by investing in local business expenditures as well as state and local taxes.

The applicant indicates that procurement of construction resources will give preference to local, union construction craft employees. In addition, Plummer Solar has indicated that they have held meetings with several tribes to discuss potential employment and investment opportunities in the project, and will make every effort to utilize tribal members for contracting, subcontracting, and workforce, that can perform the scopes of services needed. The applicant anticipates supporting 150-200 union temporary construction and installation jobs for this project, following the prevailing wage and apprenticeship rules in place under the United States Inflation Reduction Act, a federal public law signed in 2022. The Inflation Reduction Act offers enhanced tax benefits for a range of clean energy projects. Taxpayers that wish to take advantage of an enhanced clean energy tax benefits must ensure that all laborers and mechanics are paid the applicable prevailing wage, including fringe benefits, for all hours performing construction or repair, and must employ apprentices from registered programs for a certain number of hours.[75] The applicant expects general skilled labor to be available in Red Lake County or Minnesota to serve the basic infrastructure and site development needs, with specialized labor being required for certain aspects of the project.[76]

Once the project is operational, Plummer Solar will pay property tax and production taxes on the land and energy production to local governments. Property taxes are calculated on the land underlying the facility. Because the land for the solar generating facility is used primarily for solar generation, the land is classified as Class 3a (commercial/industrial/public utility) which is taxed at a higher rate than land used primarily for homestead or agriculture. The value of the generation equipment is exempted from the property tax.[77]

Minnesota has adopted a production tax of $1.20/MWh paid 80 percent to counties and 20 percent to the cities and townships.[78] Plummer Solar estimates that in the first year the project will create an annual state and local benefit of approximately $780,000 in total, with $430,000 to Red Lake County, $210,000 for Emardville Township, and approximately $140,000 for the state.[79]

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[75] U.S. Department of Labor, *Prevailing Wage and the Inflation Reduction Act*. https://www.dol.gov/agencies/whd/IRA

[76] SPA, p. 54

[77] Minnesota Statutes 272.02, subdivision 24; Minnesota House Research, *Property Tax 101: Property Tax Variation by Property Type*, July 2022, https://www.house.leg.state.mn.us/hrd/pubs/ss/ssptvart.pdf .

[78] *Minnesota Department of Revenue. 2021.* https://www.revenue.state.mn.us/solar-energy-production-tax#:~:text=The%20Solar%20Energy%20Production%20Tax%20rate%20is%20%241.20%20per%20megawatt,nameplate%20capacity%20exceeding%201%20megawatt

[79] SPA, p. 54

The applicant anticipates the project will require approximately 150-200 jobs during the construction and installation phases, and up to 3-4 long-term personnel during the operations phase. Indirect economic benefits will occur from additional local spending on lodging, goods and services and local sales tax.[80]

If the project is constructed, approximately 796.9 acres will be removed from agricultural production that are currently used to produce corn, winter wheat, and soybeans. The removal of cultivated land is likely to result in an incremental decrease to agricultural-related businesses, such as farm dealerships, seed dealers, and dealers of agricultural inputs such as fertilizer and pesticides, in the area. The extent of any decrease in sales is difficult to determine, but the removal of approximately 0.4 percent of the approximately 196,716 acres of farmland in Red Lake County is unlikely to have a significant impact.[81] Adverse impacts associated with the loss of agricultural land and agricultural production will be mitigated through lease payments to landowners.

MITIGATION

Socioeconomic impacts are anticipated to be positive. Section 8.5 of the DSP requires quarterly reports concerning efforts to hire Minnesota workers. Consistent with Minn. Stat. 216E.03, subd. 10 (c). Section 4.5.3 requires the permittee, as well as its construction contractors and subcontractors, to pay no less than the prevailing wage rate. No additional mitigation is proposed.

Plummer Solar states that they have had meetings with several tribes to discuss the project and potential invest opportunities.[82] Section 5.1 of the DSP is a special condition that requires Plummer Solar to continue local tribal engagement in order to provide meaningful opportunities for tribal employment throughout the project.

4.3.9 Environmental Justice

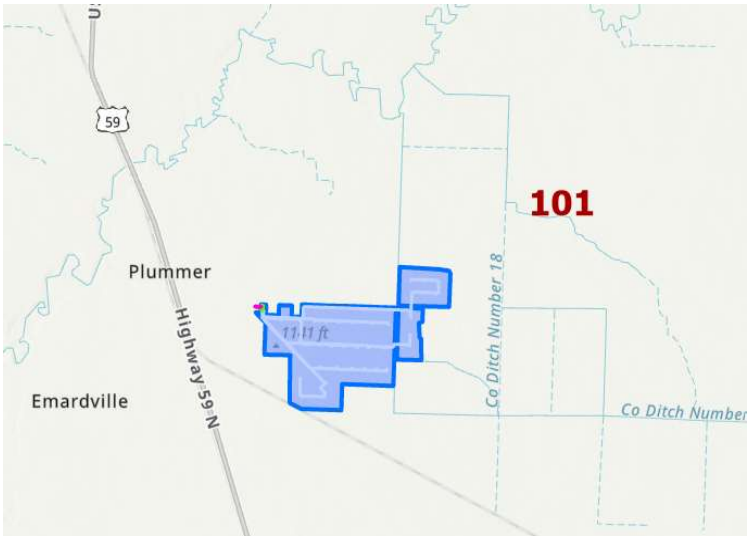
The ROI for economic justice analysis is the region. The project will not have disproportionately high and adverse human health or environmental effects on low-income, minority, or tribal populations.

Environmental justice is “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”[83] The goal of this "fair treatment" is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.[84]

Figure 13. Census Tracts in Project Area*

[80] Id.
[81] USDA, Census of Agriculture County Profile, Red Lake County Minnesota (2022). https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27125.pdf.
[82] SPA, p. 29.
[83] US EPA Environmental Justice, https://www.epa.gov/environmentaljustice .
[84] US EPA, Guidance for Incorporating Environmental Justice Concern in EPA's NEPA Compliance Analyses (pdf),

Potential Impacts



*Entire project is located within Census Tract 101

Utility infrastructure can adversely impact low-income, minority or tribal populations. To identify potential environmental justice concerns in the project area, the US EPA's EJ Screening Tool was used to consider the composition of the affected area to determine whether low-income, minority or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations.[85] Low-income and minority populations are determined to be present in an area when the low-income percentage or minority group percentage exceeds 50 percent or is "meaningfully greater" than in the general population. In this analysis, a difference of 10 percentage points or more was used as the threshold to distinguish whether a "meaningfully greater" low-income or minority population resides in the ROI.

Staff conducted a demographic assessment of the affected community to identify low-income and minority populations using U.S. Census data.

Table 11 provides low-income and minority population data and Figure 13 shows the census tract used to compare the project area with Red Lake County.

Table 11. Low-Income and Minority Population Characteristics

Area	% Below Poverty Level	Median Household Income ($)	% Minority Population‡
Region of Comparison			
Minnesota	9.3	$84,313	22.3
Red Lake County	9.3	$73,889	8.9
Project Census Tract			
Census Tract 101	9.4	$76,250	7.5

Source: U.S. Census Bureau, 2022 American Community Survey5-year Estimate

‡ Minority population includes all persons who do not self-identify as white alone.

[85] US EPA EJ Screen, https://www.epa.gov/ejscreen..

MITIGATION

The project will not create disproportionate or adverse impacts to low-income or minority populations because the percentage of low-income and minority residents in the project area is not meaningfully greater than Red Lake County or the state of Minnesota. Additional mitigation is not proposed.

4.4 Human Health and Safety

Construction and operation of a solar facility has the potential to impact human health and safety.

4.4.1 Electronic and Magnetic Fields

The ROI for EMF is the area of land control. Impacts to human health from possible exposure to EMFs are not anticipated.

EMFs are invisible forces that result from the presence of electricity. They occur naturally and are caused by weather or the geomagnetic field. They are also caused by all electrical devices and found wherever people use electricity. EMFs are characterized and distinguished by their frequency, that is, the rate at which the field changes direction each second. Electrical lines in the United States have a frequency of 60 cycles per second or 60 hertz, which is extremely low frequency EMF ("ELF-EMF"). The strength of an electric field decreases rapidly as it travels from the conductor and is easily shielded or weakened by most objects and materials.

Voltage on a conductor creates an electric field that surrounds and extends from the wire. Using water moving through a pipe as an analogy, voltage is equivalent to the pressure of the water moving through the pipe. The strength of the electric field is measured in kilovolts per meter (kV/m). Electric fields decrease rapidly as they travel from the conductor and are easily shielded or weakened by most objects and materials.

Current moving through a conductor creates a magnetic field that surrounds and extends from the wire. Using the same analogy, current is equivalent to the amount of water moving through the pipe. The strength of a magnetic field is measured in milliGauss (mG). Like electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases; however, unlike electric fields, magnetic fields are not easily shielded or weakened.

Table 12 provides examples of electric and magnetic fields associated with common household items. "The strongest electric fields that are ordinarily encountered in the environment exist beneath high voltage transmission lines. In contrast, the strongest magnetic fields are normally found very close to motors and other electrical appliances, as well as in specialized equipment such as magnetic resonance scanners used for medical imaging."[86]

Table 12. Electric and Magnetic Field Strength of Common Household Objects[87]

Electric Field*	Magnetic Field**

[86] World Health Organization. *Radiation: Electromagnetic Fields, What are typical exposure levels at home and in the environment?* (2016). https://www.who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields

[87] Id.

Appliance	kV/m	Appliance	mG		
	1 foot		1 inch	1 foot	3 feet
Stereo	0.18	Circular saw	2,100 to 10,000	9 to 210	0.2 to 10
Iron	0.12	Drill	4,000 to 8,000	22 to 31	0.8 to 2
Refrigerator	0.12	Microwave	750 to 2,000	40 to 80	3 to 8
Mixer	0.10	Blender	200 to 1,200	5.2 to 17	0.3 to 1.1
Toaster	0.08	Toaster	70 to 150	0.6 to 7	< 0.1 to 0.11
Hair Dryer	0.08	Hair dryer	60 to 200	< 0.1 to 1.5	< 0.1
Television	0.06	Television	25 to 500	0.4 to 20	< 0.1 to 1.5
Vacuum	0.05	Coffee maker	15 to 250	0.9 to 1.2	< 0.1

* German Federal Office for Radiation Safety
** Long Island Power Institute

Health Studies In the late-1970s, epidemiological studies indicated a weak association between childhood leukemia and ELF-EMF levels. "Epidemiologists observe and compare groups of people who have had or have not had certain diseases and exposures to see if the risk of disease is different between the exposed and unexposed groups but does not control the exposure and cannot experimentally control all the factors that might affect the risk of disease."[88]

Ever since, researchers have examined possible links between ELF-EMF exposure and health effects through epidemiological, animal, clinical, and cellular studies. To date, "no mechanism by which ELF-EMFs or radiofrequency radiation could cause cancer has been identified. Unlike high-energy (ionizing) radiation, EMFs in the non-ionizing part of the electromagnetic spectrum cannot damage DNA or cells directly," that is, the ELF-EMF that is emitted from HVTLs does not have the energy to ionize molecules or to heat them.[89] Nevertheless, they are fields of energy and thus have the potential to produce effects.

> "The few studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer."[90]

[88] National Institute of Environmental Health Sciences. *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power.* (2002). https://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

[89] National Cancer Institute. *Magnetic Field Exposure and Cancer*. (2016). http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/magnetic-fields-fact-sheet.

[90] National Institute of Environmental Health Sciences. *Electric and Magnetic Fields*, (2018). http://www.niehs.nih.gov/health/topics/agents/emf/index.cfm.

> "Overall there is no evidence that exposure to ELF magnetic fields alone causes tumors. The evidence that ELF magnetic field exposure can enhance tumor development in combination with carcinogens is inadequate."[91]

> "A number of scientific panels convened by national and international health agencies and the U.S. Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe."[92]

The Minnesota State Interagency Working Group on EMF Issues, comprised of staff from state agencies, boards, and Commission, was tasked to study issues related to EMF. In 2002, the group published *A White Paper on Electric and Magnetic Field Policy and Mitigation Options*, and concluded the following:

> "Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF…. However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship…, nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.
>
> The Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk cannot be dismissed.[93]"

Regulations and Guidelines Currently, there are no federal regulations regarding allowable ELF-EMF produced by power lines in the United States; however, state governments have developed state-specific regulations. For example, Florida limits electric fields to 2.0 kV/m and magnetic fields to 150 mG at the edge of the ROW for 161 kV transmission lines.[94] Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (Table 13)

Table 13. International Electric and Magnetic Field Guidelines

[91] World Health Organization. *Extremely Low Frequency Fields*. (2007). http://www.who.int/peh-emf/publications/Complet_DEC_2007.pdf?ua=1, page 10.

[92] State of Minnesota, State Interagency Working Group on EMF Issues (2002) *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*, https://apps.commerce.state.mn.us/eera/web/project-file?legacyPath=/opt/documents/EMF%20White%20Paper%20-%20MN%20Workgroup%20Sep%202002.pdf: page 1.

[93] Id., page 36.

[94] Florida Department of State. *Rule 62-814.450 Electric and Magnetic Field Standards*. (2008). https://www.flrules.org/gateway/ruleNo.asp?id=62-814.450.

Organization	Electric Field (kV/m)		Magnetic Field (mG)	
	Public	Occupational	Public	Occupational
Institute of Electrical and Electronics Engineers	5.0	20.0	9,040	27,100
International Commission on Non-Ionizing Radiation Protection	4.2	8.3	2,000	4,200
American Conference of Industrial Hygienists	—	25.0	—	10,000/ 1,000[a]
National Radiological Protection Board	4.2	—	830	4,200

[a] For persons with cardiac pacemakers or other medical electronic devices

POTENTIAL IMPACTS

Potential impacts are anticipated to be negligible and are not expected to negatively affect human health. Impacts will be long-term and localized but can be minimized. The primary sources of EMF from the generating facility will be from the solar arrays, buried electrical collection lines, and the transformers installed at each inverter. The EMF generated by solar arrays is at the level generally experienced near common household appliances. Measured magnetic fields at utility-scale PV projects drop to very low levels of 0.5 mG or less at distances of 150 feet from inverters.[95]

MITIGATION

No health impacts from EMF are anticipated. EMF diminishes with distance from a conductor or inverter. The neareset solar array is located approximately 320 feet from the nearest residence, the nearest inverter is located approximately 651 feet from the nearest residence and the nearest 34.5 kV collector line is approximately 418 feet from the nearest residence. At this distance both electric and magnetic fields will dissipate to background levels. No additional mitigation is proposed.

4.4.2 Public Safety and Emergency Services

The ROI for public and work safety is the land control area. Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Public risks involve electrocution. Electrocution risks could also result from unauthorized entry into the fenced area. There is the potential for land has previously been impacted by hazardous substances to be encountered, and hazardous materials must be documented, monitored, and disposed in coordination with MPCA. Potential impacts are anticipated to be minimal. Impacts would be short- and long-term and can be minimized.

Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Construction might disturb existing environmental hazards on-site, for example, contaminated soils. During operation there are occupational risks similar to those associated with construction. Public risks would result from unauthorized entry into the facility.

[95] George Flowers and Tommy Cleveland, *Health and Safety Impacts of Solar Photovoltaics*, (2017). North Carolina Clean Energy Technology Centerhttps://content.ces.ncsu.edu/health-and-safety-impacts-of-solar-photovoltaics , at p. 13

Construction crews must comply with local, state, and federal regulations when installing the project. This includes standard construction-related health and safety practices. This generally includes safety orientation and training, as well as daily/weekly safety meetings.

Emergency services in the project area are provided by local law enforcement and emergency response agencies located in nearby communities. Law enforcement in the project area is provided by the Red Lake County Sheriff. Fire service is provided by the Plummer Fire Department. Ambulance response is provided by the Red Lake Falls Ambulance, and the Oklee Emergency Squad. The nearest hospital is Northwest Medical Center in Thief River Falls, approximately 16 miles north of the project.

Plummer Solar conducted a review of site contamination using the MPCA What's in My Neighborhood databoase. The review indicated that there are two environmental records within the project area, and two environmental records within a 0.25 mile radius of the project boundary. Environmental records include contamination investigation and cleanup, construction stormwater, hazardous waste, and feedlot listings.

A portion of the project area is on land where a documented crude oil spill previously occurred. Per MPCA, the site was closed and restrictions on agricultural use and cropping of this area remain in place to prevent exposure. Plummer Solar evaluated subsurface conditions during the completion of geotechnical borings. Soil recovered was screened for evidence of crude oil contaminations at regular intervals, and no odors, discoloration, sheen, or elevated organic vapor headspace readings were observed within the area of the documented crude oil spill.[96] Outside of the project area, there is an inactive petroleum leak site located 0.48 miles west of the project boundary, however there is no documented groundwater condamination. In addition, there are six other petroleium leak sites and one tank site within a 1.25 mile radius of the project area in the northwest direction. There are also several active pipelines located within a pipeline ROW running from northwest to southeast of the project area.

Potential Impacts

Worker safety issues are primarily associated with construction. Public safety concerns would be most associated with unauthorized entry to the project.

The inflow of temporary construction personnel could increase demand for emergency and public health services. On the job injuries of construction workers requiring assistance due to slips, trips or falls, equipment use, or electrocution can create a demand for emergency, public health, or safety services that would not exist if the project were not to be built. Although no road closures are anticipated during construction,[97] any temporary closures could impede police, fire, and other rescue vehicles access to the site of an emergency.

The project area is also on land that has environmental records documenting a crude oil spill. Although subsurface evaluations showed no presence of oil, there is potential that soil containing historical residual crude oil could be encountered during construction.

[96] SPA, p. 36
[97] SPA, p. 71

In Minnesota, unless solar panels discarded by commercial entities are specifically evaluated as non-hazardous, the panels are assumed to be hazardous waste due to the probable presence of heavy metals. Heavy metals in solar panels can include arsenic, cadmium, lead, and selenium. If hazardous waste, they must be properly disposed of in a special facility or recycled if recyclers are available.[98]

MITIGATION

The project will be designed and constructed in compliance with applicable electric codes. Electrical inspections will ensure proper installation of all components, and the project will undergo routine inspection. Electrical work will be completed by trained technicians.

Construction is bound by federal and state Occupational Safety and Health Administration (OSHA) requirements for worker safety, and must comply with local, state, and federal regulations regarding installation of the facilities and qualifications of workers. Established industry safety procedures will be followed during and after construction of the project. Solar indicates that the project will be fenced and locked to prevent unauthorized access, and signs will be posted to warn unauthorized persons not to enter fenced area due to the presence of electrical equipment.

In the case that soils are encountered that contain historic residual crude oil, Plummer Solar indicates that the Contaminated Sites Management Plan (CSMP) will be followed. The CSMP plan includes indentification, notification and documentation of the contamination, management of the contaminated materials (e.g., soil, water) through proper removal and disposal with continuous testing and monitoring of the area, and reporting to the MPCA for any observations and management activty that took place within the contaminated area.[99]

Public safety is addressed in several sections of the DSP (**Appendix C**):

- Section 4.3.30 requires the permittee to take several public safety measures, including landowner educational materials, appropriate signs and gates, etc.
- Section 5.2 is a special condition that requires Plummer Solar to follow the CSMP in the event that contaminated materials are discovered, and to notify and coordinate with MPCA for proper removal and disposal of the contaminated materials and restoration of the land.
- Section 8.12 requires permittees file an *Emergency Response Plan* with the Commission and local first responders prior to operation.
- Section 8.13 requires disclosure of extraordinary events, such as fires, etc.
- Section 9.1 requires a decommissioning plan prior to construction and updated every five years. Periodic updates of the plan will address the developing information on end-of-life issues related to PV panels.

No additional mitigation is proposed.

4.5 Land-based Economies

[98] MPCA, *2017 Toxics and Pollution Prevention Evaluation Report*, p. 22- 23 https://www.lrl.mn.gov/docs/2018/mandated/180453.pdf

[99] SPA, Appendix J. Contaminated Sites Management Plan.

Solar facilities impact land-based economies by precluding or limiting land use for other purposes.

4.5.1 Agriculture

The ROI for agriculture is the land control area. Potential impacts to agricultural producers are anticipated to be minimal to moderate — lost farming revenues will be offset by lease or easement agreements. A loss of farmland in Red Lake County County would occur for the life of the project. Potential impacts are localized and unavoidable but can be minimized.

Agricultural use dominates the area of land control, with approximately 94.8 percent (755.3 acres) of the area used for cultivated row crops (corn, soybeans, and spring wheat are the dominant crops).

In 2017, there were approximately 208,748 acres of farmland in Red Lake County, comprising approximately 76 percent of all land in the county. There are a total of 263 individual farms located in Red Lake County, with an average farm size of 794 acres. Cropland, which includes grains, oilseeds, dry beans, dry peas, vegetables, and hay, make up 89 percent of the farmland, with livestock and poultry making up the remaining 11 percent. The market value of agricultural production in Red Lake County in 2017 was approximately $65.6 million.

Prime farmland is defined by Federal regulation at 7 C.F.R.657.5(a)(1) as “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.” Approximately 85 percent of the project area is designated as prime farmland if drained (679.5 acres), 1.5 percent is designated as prime farmland (11.8 acres) and 13 percent is designated as farmland of statewide importance (102.4 acres).[100] With respect to prime farmland, the applicant indicates that no feasible or prudent alternatives to the project exist.

POTENTIAL IMPACTS

The impact intensity level will range from minimal to moderate. The intensity of the impact is likely to be subjective. For example, conversion of farmland to solar energy production can be viewed as a conversion from one type of industrial use to another. Conversely, the conversion of farmland to solar energy production can be viewed as a negative impact to agricultural production. Restoring the site with native grasses and forbs will reduce soil erosion, provide pollinator and wildlife benefits, and improve soil health. This EA acknowledges that the perceived impacts to prime farmland are subjective and may be difficult to assess given the trade-offs associated with utility scale solar projects.

Rural areas, with large parcels of relatively flat, open land, are ideal for solar development, which require six to eight acres of land to generate one MW of electricity. The project will result in up to 755 acres of farmland being removed from agricultural production for the life of the project. This change in land use would take productive farmland out of production for the life of the project, representing approximately 0.3 percent of existing agricultural land in Red Lake County. The applicant indicates that the land could be returned to agricultural uses after the project is decommissioned and the site is restored.

[100] SPA, p. 75

Construction of the project has the potential to damage agricultural soils through compaction or erosion if BMPs are not implemented to minimize damage.

MITIGATION

Several sections of the DSP (**Appendix C**) address agricultural mitigation and soil-related impacts:

- Section 4.3.9 requires protection and segregation of topsoil.
- Section 4.3.10 requires measures to minimize soil compaction.
- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls to ensure that stormwater does not become a problem on or off-site.
- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".
- 4.3.17 requires the permittee to develop a VMP that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Plummer Solar has included a draft VMP as Appendix H of its site permit application.
- Section 4.3.18 requires the permittee to develop an AIMP with MDA. Plummer Solar's draft AIMP (Appendix G of its site permit application) details methods to minimize soil compaction, preserve topsoil, control noxious weeds and invasive species, maintain the existing drainage conditions through appropriate maintenance and repair of existing drain tile, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.
- Section 4.3.20 requires the permittee to develop an Invasive Species Management Plan to prevent introduction and spread of invasive species during construction of the project.
- Section 4.3.21 requires the permittee to take reasonable precautions against the spread of noxious weeds.
- Section 4.3.29 requires the permittee to fairly restore or compensate landowners for damages to crops, fences, drain tile, etc. during construction.

Plummer Solar indicates that best management practices (BMPs) would be implemented during construction in order to minimize and mitigate long-term impacts to agricultural lands, including project design that minimizes infrastructure to the degree practicable, preventing soil profile mixing, halting construction during wet weather conditions, ensuring proper site drainage and erosion control, and limiting the spread of noxious weeds and invasive species by cleaning construction equipment. Following construction, Plummer Solar indicates that disturbed areas would be repaired and restored to pre-construction contours and characteristics to the extend possible.[101]

[101] SPA, p. 63

4.5.2 Tourism

The ROI for tourism is the project area. Impact intensity is expected to be minimal, and short-term in duration. There may be potential for impacts to local recreational activities during construction, however impacts will be temporary.

Tourism in the local area is primarily limited to outdoor recreational activities, including snowmobile trails, parks, and hunting grounds.

POTENTIAL IMPACTS

All project facilities will be located on privately-owned land, therefore impacts to tourism and recreation are anticipated to be minimal. Short-term impacts to outdoor recreational activities could occur duing construction dur to noise and traffic increase, however these impacts will be temporary and short-term in duration.

MITIGATION

Because significant impacts are not anticipated, no additional mitigation measures are proposed.

4.6 Archeological, Cultural, and Historic Resources

The ROI for archeological and historic resources is the project area. The impact intensity level is anticipated to be negligible to minimal. Impacts would be localized. Impacts can be mitigated through prudent siting.

Archeological resources are locations where objects or other evidence of archaeological interest exist, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.[102] Historic resources are sites, buildings, structures, or other antiquities of state or national significance.[103]

Construction and operation of project has the potential to impact resources that have importance to American Indian Tribes with ties to the region. Siting of large energy facilities in a manner that respects historic and cultural ties to the land requires coordination with tribes.

POTENTIAL IMPACTS

Plummer Solar reports contacting the eleven federally recognized Tribal Nations in Minnesota, including Minnesota Tribal Nations' Tribal Historic Preservation Officers and the Minnesota Indian Affairs Council for additional information or comment on the project.[104] Three tribes expressed interest in ongoing project updates, including the Red Lake Nation, the Leech Lake Band of Ojibwe, and the Fond du Lac Band of Lake Superior Chippewa.[105] Plummer Solar received feedback from the Leech Lake Band of Ojibwe, stating that there are no known recorded sites of religious or cultural indentified resources within the area.[106]

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[102] Minnesota Statutes, Section. 138.31, subd. 14.
[103] Minnesota. Statutes, Section 138.51.
[104] SPA, p. 91
[105] SPA, pp. 96, Table 20.
[106] Plummer Solar, Comments – SHPO Update Letter, August 15, 2024, eDocket no. 20248-209532-01, Attachment B

Plummer Solar conducted a Phase I survey and a Traditional/Tribal Cultural Resources Survey (TCRS) of the project area in July and October of 2022, and May of 2023. The survey examined records from the Minnesota State Historic Preservation Office (SHPO) and Minnesota Office of the State Archeologist for an area within one mile of the area of land control. In addition, the National Register of Historic Places database and National Historic Landmark list for Minnesota were consulted, along with a review of available historic maps.

The literature review identified three previously documented archaeologic sites within the area of land control, as well as three additional archaeological sites and 10 historic/architectural resources within one mile of the area of land control. The documented cultural resources within the area of land control includes site 21RL0033, which consists of the remnants of a historic, mid-twentieth century homestead that was recommended not eligible for NRHP, and sites 21RL0041 and 21RL0042, which appear to consist of omarolluk erratics that were identified by the TCRS as possibly being utilized by precontact people, and were also recorded as archeological sites. The TCRS determined that these precontact sites, in addition to other known precontact sites within one mile of the area of land control, demonstrate an extended history of tribal use of the area.

The TCRS also identified numerous trees, plants, and wildlife traditionally used by tribles for food, medicine, arts, ceremony, and/or other materials present within the project area. The results of the Phase I identified that no archeological sites within the area of land control are eligible for listing in the NRHP.[107] SHPO concurred with this determination, stating "Therefore, we conclude that there are no properties listed in the National or State Registers of Historic Places and no known or suspected archaeological properties in the area that will be affected by this project."[108]

MITIGATION

Prudent siting to avoid impacts to archaeological and historic resources is the preferred mitigation. Section 4.3.23 of the DSP (**Appendix C**)) address archeological resources and require the permittee to avoid impacts to archaeological and historic resources where possible and to mitigate impacts where avoidance is not possible. If previously unidentified archaeological sites are found during construction, the permit requires the permittee to stop construction and contact SHPO to determine how best to proceed. Ground disturbing activity will stop, and local law enforcement will be notified should human remains be discovered.

Additionally, Section 5.3 of the DSP (**Appendix C**) requires preparation of an Unanticipated Discoveries Plan outlining steps to be taken if previously unrecorded cultural resources or human remains are encountered during construction. Plummer Solar indicated that before construction begins, an Unanticipated Disoveries Plan will be prepared, and should any previously unknown cultural resources or human remains be encountered, work will stop, and the discovery will be examined by an archaeologist. If the discovery is determined to be a significant cultural resource, SHPO and OSA will be notified. With regard to a discovery of potential human remains, procedures would be followed to

[107] SPA, p. 65
[108] Plummer Solar, Comments – SHPO Update Letter, August 15, 2024, eDocket no. 20248-209532-01, Attachment B.

verify if the remains are human and that the appropriate authorities would become involved quickly and in accordance with local and state guidelines.[109]

A special condition requiring Plummer Solar to engage an independent third party tribal monitor to observe and monitor construction activities may be required to minimize the potential for inadvertent discoveries of cultural resources.

4.7 Natural Resources

Solar facilities impact the natural environment. Impacts are dependent upon many factors, such as how the project is designed, constructed, maintained, and decommissioned. Other factors, for example, the environmental setting, influence potential impacts. Impacts can and do vary significantly both within, and across, projects.

4.7.1 Air Quality

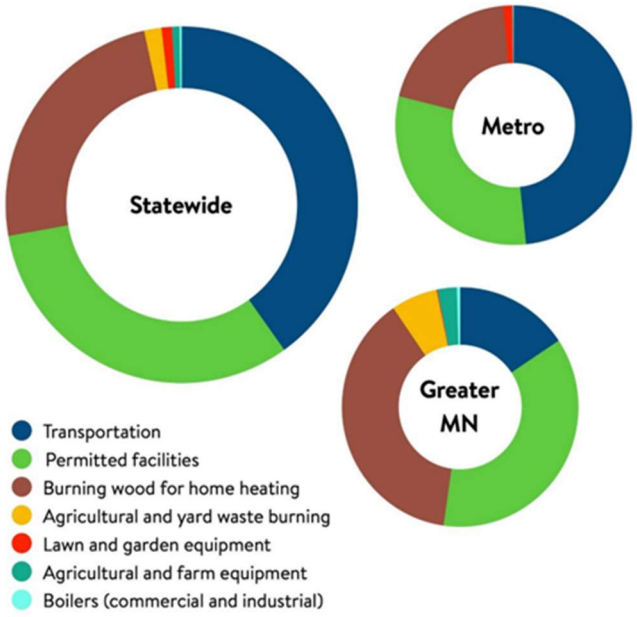
The ROI for air quality and climate change is the region. Potential impacts to air quality during construction would be intermittent, localized, short-term, and minimal. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated. Once operational, the solar array will not generate criteria pollutants or carbon dioxide. Negligible fugitive dust and exhaust emissions would occur as part of routine maintenance activities. Impacts are unavoidable and do not affect a unique resource. Impacts can be minimized.

Air quality is a measure of how pollution-free the ambient air is and how healthy it is for humans, other animals, and plants. Emissions of air pollutants will occur during construction and operation of new infrastructure for the project. Overall air quality in Minnesota has improved over the last 20 years, but current levels of air pollution still contribute to health impacts. As illustrated in Figure 14**,** today, most of our air pollution comes from smaller, widespread sources … the rest comes from a wide variety of things we use in our daily lives: our vehicles, local businesses, heating and cooling, and yard and recreational equipment.[110]

The nearest air quality monitor to the project is in Red Lake, Minnesota, approximately 45 miles east of the project area. Air quality in the area has been considered “good” between 298 and 348 days of the year from 2017-2021. During the same time period, the number of days classified as moderate occurred varied between 11 and 33. Air quality was considered unhealthy for sensitive groups on one day in both 2018 and 2019 and five days in 2021. Air quality was classified as unhealthy on one day in 2019 and three days in 2021, and very unhealthy on one day in 2021. [111] The increase in the number of days of moderate or worse air quality in 2021 was statewide and largely attributable to drought conditions and wildfire smoke in the upper Midwest. [112]

Figure 14. Air Pollution Sources by Type

[109] SPA, p. 67
[110] MPCA *The State of Minnesota’s Air Quality, January 2023 Report to the Legislature*, https://www.lrl.mn.gov/docs/2022/mandated/221697.pdf
[111] MPCA. *Annual AQI Days by Reporting Region*, https://public.tableau.com/app/profile/mpca.data.services/viz/MinnesotaAirQualityIndex_0/AQIExternal
[112] MPCA. The Air We Breathe: The State of Minnesota’s Air Quality in 2021, 2023, https://www.lrl.mn.gov/docs/2022/mandated/221697.pdf p. 4,



Potential Impacts

Minimal intermittent air emissions are expected during construction of the project. Air emissions associated with construction are highly dependent upon weather conditions and the specific activity occurring. For example, traveling to a construction site on a dry gravel road will result in more fugitive dust than traveling the same road when wet. Once operational, neither the generating facility nor the transmission line will generate criteria pollutants or carbon dioxide.

Air emissions from project construction activites would likely primarily include carbon dioxide (CO2), nitrogen oxides (NOx) and other particulate matter. Motorized equipment will emit exhaust. This includes construction equipment and vehicles travelling to and from the project. Exhaust emissions, primarily from diesel equipment, would vary according to the phase of construction.

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions. The project will generate fugitive dust from travel on unpaved roads, grading, and excavation. Dust emissions would be greater during dry periods and in areas where fine-textured sols are subject to surface activity.

Emissions associated with maintenance are dependent upon weather conditions and the specific activity occurring. Vehicle exhaust will be emitted during maintenance visits to the generating facility. The applicant indicates that, over the life of the project, fugitive dust emissions will be reduced by the elimination of farming and establishment of perrenial native plantings and other permanent vegetative cover. The applicant also indicates that the project will have a positive effect on air quality by replacing electrical generation produced by burning fossil fuels, reducing associated greenhouse gas emissions.

MITIGATION

Exhaust emissions can be minimized by keeping vehicles and equipment in good working order, and not running equipment unless necessary. Plummer Solar indicdates that best management practices will be used during construction and operation of the project to minimize dust and emissions.

As a component of the construction stormwater permit that will be obtained for the project, a National Pollutant Discharge Elimination System/State Disposal System construction stormwater permit and an associated Stormwater Pollution Prevention Plan (SWPPP) will be developed and implemented prior to construction in order to minimize the potential for fugitive dust emissions.

Watering exposed surfaces, covering disturbed areas, and reducing speed limits on-site are all standard construction practices.

The AIMP identifies construction best management practices related to soils and vegetation that will help to mitigate against fugitive dust emissions. Several sections of the draft plan indirectly mitigate impacts to air quality, including sections related to construction and vegetation removal, soils, erosion and sediment control, and restoration of the site to pre-construction conditions.[113]

4.7.2 Geology and Groundwater

The ROI for geology and groundwater is the land control area. Impacts to domestic water supplies are not expected. Impacts to geology are not anticipated. Localized impacts to groundwater resources, should they occur, would be intermittent, but have the potential to occur over the long-term. Indirect impacts from surface waters might occur during construction. Impacts can be mitigated through use of BMPs for stormwater management.

Groundwater in Minnesota is largely a function of local geologic conditions that determine the type and properties of aquifers. Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The project site is within the Province 5, the Western Province, and is characterized by moderate surficial sands and limited buried sands. Province 5 is underlain by fractured bedrock buried deeply beneath glacial sediment, and is of limited use as an aquifer. In this province, sediment is relatively fine grained with higher amounts of clay and silt, and aquifers are less common.[114]

Pollution sensitivity of near surface materials in the project area is in the "ultra low" category.[115] The sensitivity to pollution of near-surface materials is an estimate of the time it takes for water to travel through the unsaturated zone to reach the water table, which for the purposes of the model was assumed to be 10 feet below the land surface.[116] This means that the project area is generally expected to have "ultra low" groundwater pollution sensitivity where contaminants from the land surface

[113] SPA, Appendix G. AIMP.
[114] DNR, Minnesota Groundwater Provinces (2021) https://www.dnr.state.mn.us/waters/groundwater_section/mapping/provinces.html
[115] Minnesota Natural Resource Atlas, retrived from https://mnatlas.org/gis-tool/.
[116] Adams, R. (June 2016) Pollution Sensitivity of Near-Surface Materials, retrieved from: https://www.leg.state.mn.us/docs/2017/other/170839.pdf , page 3.

would not reach groundwater for more than a year.[117] Low sensitivity does not guarantee protection. Leakage from an unsealed well for example, may bypass the natural protection, allowing contamination to directly enter an aquifer.

Depth to bedrock beneath the project is estimated to be greater than 300 ft. Depth to water table in the preliminary development area ranges from just below the surface to more than 45 inches depending on the soil type.[118] Depth to water table is shallower in the mapped hydric soils and areas delineated as wetland, and deeper in the non-hydric soil units.

The land control area was reviewed for EPA designated sole source aquifers, wells listed on the Minnesota Well Index (MWI) and MDH Wellhead Protection Areas (WHPAs).[119] The MDH maintains the Minnesota Well Index (MWI), which provides basic information (e.g., location, depth, geology, construction, and static water level) for wells and borings drilled in Minnesota. The MWI does not identify any documented wells within the project site, however within a half a mile of the project area there are eight active domestic wells and a seven sealed wells documented as of 2022.[120]

Under the Safe Drinking Water Act, 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. 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 (2023b). A search for WHPAs in the MDH database indicated that the land control area is located entirely outside of any WHPA. The nearest WHPA is the Plummer WHPA located less than a mile northwest of the land control area.

Potential Impacts

Potential impacts to geology and groundwater can occur directly or indirectly. Impacts to geological resources are likely to be minimal, due to the presence of fractured bedrock and limited use of aquifers, and the absence of karst features.

Geotechnical soil borings were completed in 2023 to inform the design, engineering, and construction techniqes for the proposed project. According to MWI records provided by MDH, shallow groundwater has been encountered at three ft. below ground surface in two monitoring wells that are within a half mile of the project area. Plummer Solar states at the time of the soil borings, groundwater had been encountered in seven of the thirty-one borings ranging at depths from 10 to 18 ft. below the surface, and in three at shallower depths ranging from 3.5 to 7.5 ft. below the surface.

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[117] DNR, Methods to Estimate Near-Surface Pollution Sensitivity, retrieved from: https://files.dnr.state.mn.us/waters/groundwater_section/mapping/gw/gw03_ps-ns.pdf .
[118] Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
[119] SPA, p.77
[120] MDH (n.d.) *Minnesota Well Index* https://www.health.state.mn.us/communities/environment/water/mwi/index.html .

Direct impacts to groundwater are generally associated with construction, for example, structure foundations that could penetrate shallow water tables or groundwater usage. Indirect impacts could occur through spills or leaks of petroleum fluids or other contaminants that contaminate surface waters which could ultimately contaminate groundwater. The disturbance of soil and vegetative cover could affect water quality in groundwater resources. Impacts to groundwater resources, including aquifers and the Clearwater River, are not anticipated as water supply needs will be limited and aquifers are not common in the area.

Construction of the project is not likely to require subsurface blasting, and newly fractured bedrock causing groundwater flow is not anticipated. There are no active wells within the project area, and no SSAs, WHPAs, DWSMAs, or Special Well and Boring Construction Areas. A domestic well is likely to be installed as a component of the O&M building. Plummer Solar acknowledges that the construction of a solar project will create an increase in impervious and semi-impervious surfaces within the area of land control. This could lead to an increase of stormwater runoff, and in turn reduce groundwater recharge.

The project is not anticipated to require the use or storage of large quantities of hazardous materials that might otherwise have the potential to spill or leak into area groundwater. If the project facilities include oil storage of more than 1,320 gallons, a Spill Prevention, Control, and Countermeasure (SPCC) Plan may be required. This permit could potentially be required for the transformers within the project substation. Plummer Solar states that transformers would be contained per EPA requirements.[121]

The variables from the applicant's geotechnical study 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 approximately 9 feet to 19 feet below ground surface, depending on soil properties and other factors.[122] Concrete foundations are not expected to be used for the solar array as driven piers or helical piles, based on site-specific conditions, will be used for racking system foundation.[123]

The electrical collection system, DC and AC collection systems, is anticipated to be installed below-ground. The panels deliver DC power to the inverters through below-ground DC cabling that will be installed in trenches at a depth of at least three feet below grade.

MITIGATION

Stormwater management is important to ensure that structure foundations maintain their integrity and that rainwater and surface runoff drain away from the project structures and roads in a way that does not adversely affect existing drainage systems, roads, or nearby properties. Appropriate permanent stormwater management measures, including minimizing the area of impervious surfaces at the site to reduce the volume and velocity of the stormwater runoff and the establishment of multiple stormwater ponds, will address drainage from the newly established impervious areas.

[121] SPA, p. 73
[122] SPA, p. 72
[123] SPA, p. 22

Plummer Solar indicates that solar panels will be mounted above the ground with a low-maintenance perennial seed mix underneath, allowing water to filter into vegetation and soil prior to discharging.

Plummer Solar plans to install a well to supply water to the O&M building. Any new wells require notification to MDH and would be constructed by a well borer licensed by MDH. If any previously unmapped wells are discovered, Plummer Solar should cap and abandon the well in place in accordance with MDH requirements.

Because the project will disturb more than one acre, Plummer Solar must obtain a CSW Permit from the MPCA. The CSW Permit will identify BMPs for erosion prevention and sediment control. As part of the CSW Permit, Plummer Solar will also develop a Stormwater Pollution Prevention Plan (SWPPP) that describes construction activity, temporary and permanent erosion and sediment controls, BMPs, permanent stormwater management that will be implemented during construction and through the life of the project. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion and detail stormwater management methods during construction and operation of the facility. Section 4.3.11 of DSP (**Appendix C**) requires the permittee to obtain a MPCA CSW Permit and implement the BMPs within for erosion prevention and sediment control. Impacts to groundwater can also be minimized by mitigating impacts to and soils and surface waters as discussed in Sections 4.7.3 and 4.7.4.

A National Pollutant Discharge Elimination System (NPDES) permit application to discharge stormwater from construction facilities will also be acquired by Plummer Solar 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.[124]

Any dewatering required during construction will be discharged to the surrounding upland vegetation, thereby allowing it to infiltrate back into the ground to minimize potential impacts. If dewatering of more than 10,000 gallons per day or 1,000,000 gallons per year, a Water Appropriations Permit from DNR is required. Plummer Solar will obtain a Water Appropriation Permit if dewatering is required.

4.7.3 Soils

The ROI for the soils is the land control area. Impacts to soils will occur during construction and decommissioning of the project. The impact intensity level is expected to be minimal. Potential impacts will both positive and negative, and short- and long-term. Isolated moderate to significant negative impacts associated with high rainfall events could occur. Because the soil at the solar facility will be covered with native perennial vegetation for the life of the project, soil health is likely to improve.

The soils deposited in the area (Table 14) are made up of nearly level, deep, poorly drained predominately hydric loamy soils. Topsoils in the land control area, including the project site, range from 0 – 12 inches, have moderate to low susceptibility to sheet and rill erosion by water, and mostly have low susceptibility to wind erosion. The soils within the site may be susceptibile to compaction or rutting during wet conditions due to the hydric texture of the soil. Most of the soils within the solar

[124] SPA, p .78

facility project site and land control area are designated primefarmland if drained (84%), and the rest is designated primefarmland of state importance (13%) and prime farmland (3%).

Table 14. Soil Types in Solar Facility Project Site[125]

Soil type	Drainage Class	Surface Texture	Acres	Percent of Project Area
Foxhome sandy loam, 0 to 2 percent slopes***	Moderately well drained	Sandy loam	31.86	4.00%
Kratka and Strathcona soils, 0 to 1 percent slopes***	Very poorly drained	Fine sandy loam	1.97	0.25%
Kratka fine sandy loam, loamy till substratum, 0 to 1 percent slopes**	Very poorly drained	Fine sandy loam	41.71	5.23%
Linveldt fine sandy loam, 0 to 2 percent slopes*	Moderately well drained	Fine sandy loam	9.39	1.18%
Northwood muck, 0 to 1 percent slopes	Very poorly drained	Muck	3.27	0.41%
Reiner fine sandy loam, 0 to 2 percent slopes*	Moderately well drained	Fine sandy loam	2.37	0.30%
Smiley loam, 0 to 1 percent slopes**	Very poorly drained	Sandy loam	637.7	80.03%
Smiley mucky loam, 0 to 1 percent slopes***	Very poorly drained	Mucky loam	12.56	1.58%
Strandquist loam, 0 to 1 percent slopes***	Very poorly drained	Sandy loam	56.01	7.03%
Solar Facility Subtotal			**796.84**	

*Prime farmland, **Prime farmland if drained, ***Farmland of Statewide Importance

POTENTIAL IMPACTS

The impact intensity level is expected to be low to moderate. Primary impacts to soils include compaction from construction equipment, soil profile mixing during grading and pole auguring, rutting from tire traffic, and soil erosion. Impacts to soils are likely to be greatest with the below-ground electrical collection system. Potentials impacts will be positive and negative, and short- and long-term. Isolated moderate to significant negative impacts associated with high rainfall events could occur. Because the soil at the solar facility would be covered with native perennial vegetation for the operating life of the project, soil health would likely improve over the operating life of the project.

Construction of the solar facility will disturb approximately 855 acres within the land control area, and 796.6 acres of that will be used for the solar facility project site. As with any ground disturbance, there is potential for soil compaction and erosion. Heavy rainfall events during construction or prior to establishment of permanent vegetation, increase the risk that significant sedimentation and erosion could occur.

[125] Soil data gathered from: SPA at p. 74, Table 18, and at Appendix G: AIMP; USDA National Cooperative Soil Survey Soil Series; Minnesota Natural Resource Atlas, retrieved from https://mnatlas.org/gis-tool/.

The soils within the site are generally loamy in texture and poorly drained. As a result, the soils are susceptible to compaction or rutting during wet conditions due to the hydric texture of the soil. The soils are less susceptible to wind erosion during dry periods due to the level nature, however areas with higher slopes may be more susceptible. Existing drain tiles may be used or new tiles installed to ensure proper drainage.

Soil cover and management at the solar facility will change from cultivated cropland to a mixture of and pervious areas with native groundcover plantings and semi-impervious surfaces. Once permanent vegetation is properly established, stormwater management, as well as general soil health, might improve due to use of native plants. The location and amount of stored topsoil will be documented to facilitate re-spreading of topsoil after decommissioning. These benefits could extend beyond the life of the project if they are preserved through decommissioning practices, and if the site is returned to agricultural use.

MITIGATION

Several sections of the DSP (**Appendix C**) address soil-related impacts

- Section 4.3.9 requires protection and segregation of topsoil;
- Section 4.3.11 requires the permittee to obtain a MPCA CSW Permit and implement the BMPs within for erosion prevention and sediment control.
- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".
- Section 4.3.17 requires the permittee to develop a VMP that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Plummer Solar has included a draft VMP as Appendix H of its site permit application.
- Section 4.3.18 requires the permittee to develop an AIMP which details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use. Plummer Solar has included a draft AIMP as Appendix G of its site permit application.

4.7.4 Surface Water and Floodplains

The ROI for surface water resources is the land control area. The impact intensity level is anticipated to be minimal. Direct impacts to surface waters are not expected. Indirect impacts to surface waters might occur. These impacts will be short-term, of a small size, and localized. Impacts can be mitigated.

Solar farm projects have the potential to impact surface water resources and floodplains. These projects could directly impact water resources and floodplains if these features cannot be avoided through project design. Projects also have the potential to adversely impact surface waters though construction activities which move, remove, or otherwise handle vegetative cover and soils. Changes in vegetative cover and soils can change runoff and water flow patterns.

The project is in the Clearwater River watershed of the Red River of the North Basin.[126] This watershed characteristically has a poorly defined flooplain and low gradient that can leave the basin subject to frequent flooding, potentially impacting urban and rural infrastructure and agricultural production. There are no lakes, rivers, or streams that cross the project site. There is a ditch, County Ditch number 57, which flows north through the project site. The nearest Public Waters Inventory (PWI) body of water is the Clearwater River, located approximately 1.4 miles north and northwest at its nearest point. The surface waters within the project site are limited to ditches, including three additional ditches outside the project site, and PWI wetlands.[127]

Under Section 303(d) of the Clean Water Act, states are required to assess all waters of the state to determine if they meet water quality standards, list waters that do not meet standards and update the list biannually and conduct total maximum daily load studies to set pollutant-reduction goals needed to restore waters to the extent that they meet water quality standards for designated uses. The list, known as the 303(d) list, is based on violations of water quality standards. The MPCA has jurisdiction over determining 303(d) waters in the State of Minnesota.

There are no waters listed by the MPCA as impaired waters within the project site. The Clearwater River, within approximately 1.4 miles north and northwest of the project, is listed as an impaired water, with aquatic consumption/aquatic life as the affected designated use and mercury in fish tissue/turbidity as the pollutant/stressor.[128]

Floodplains are flat, or nearly flat, land adjacent to a river or stream that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which includes areas covered by the flood, but which do not experience a strong current. Floodplains prevent flood damage by detaining debris, sediment, water, and ice. The Federal Emergency Management Agency (FEMA) delineates floodplains and determines flood risks in areas susceptible to flooding. The base flood that FEMA uses, known as the 100-year flood, has a one percent chance of occurring during each year.

At the state level, the DNR oversees the administration of the state floodplain management program by promoting and ensuring sound land use development in floodplain areas in order to promote the health and safety of the public, minimize loss of life, and reduce economic losses caused by flood damages. The DNR also oversees the national flood insurance program for the state of Minnesota. Floodplains are also regulated at the local level.

A FEMA flood insurance study for Red Lake County was completed in March 2021, and County Ditch 57 was identified as a Zone A floodplain; however, a regulatory floodway was not established. Other than the ditch, there are no Zone A floodplains within the land control area.[129] The applicant states that the developed area of the project will not impact FEMA floodplain areas. Due to Minnesota's warmer and wetter climate, there is increased risk for damaging rain events and more frequent flooding. These events could impact the project (Section 4.7.9).

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[126] Minnesota DNR, Minnesota's watershed basins. https://www.dnr.state.mn.us/watersheds/map.html
[127] SPA, p. 76
[128] MPCA, MPCA Impaired Waters Viewer https://gisdata.mn.gov/dataset/impaired-waters-viewer
[129] FEMA, FEMA Flood Map Service Center. https://msc.fema.gov/portal/home

Plummer Solar requested information from Red Lake County and landowners regarding drain tiles. A drain tile was identified to be present within the areas east of 230th Ave SE. Plummer Solar states that the existing drain tiles appear to adequately drain and discharge water from the project site, primarily into the county-managed ditches. No other records of drain tiles have been found in this area.

Potential Impacts

The Clearwater River Watershed is an area that historically can be impacted by issues such as wind erosion and flooding, which can cause damage to infrastructure and wildlife habitat. The watershed falls within the Red Lake Watershed District, where many projects have been completed within this district to improve or protect water quality for several years.[130]

The project is designed to avoid direct impacts to surface waters by avoiding placement of project components such as access roads, solar arrays, inverters, or transmission structures in surface waters.

Construction of the project creates a potential for indirect impacts if sediment or fugitive dust created by excavation, grading, vegetation removal, and construction traffic reaching nearby surface waters.

Overall, and due to the establishment of perennial vegetation at the solar facility, the project is expected to have a long-term positive impact on water quality.

Mitigation

Standard construction management practices, including, but not limited to containment of excavated soils, protection of exposed soils, stabilization of restored soils, and controlling fugitive dust, would minimize the potential for eroded soils to reach surface waters.

Best management practices to minimize the impact on surface waters will be utilized as a part of the SWPPP, including but not limited to sediment control, revegetation plans, and management of exposed soils to prevent sediment from entering waterbodies.[131]

Plummer Solar plans to maintain drainage system integrity during construction, including rerouting, reinforcement, or other methods outlined in the AIMP filed with the Site Permit Application.[132]

The DSP (**Appendix C**) has two standard conditions that address potential impacts to surface waters:

- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls. This section also requires implementation of erosion and sediment control measures, contours graded to provide for proper drainage, and all disturbed areas be returned to pre-construction conditions. Plummer Solar will also develop a Stormwater Pollution Prevention Plan (SWPPP) that complies with MPCA rules and guidelines. The SWPPP describes construction activity, temporary and permanent erosion and sediment controls, BMPs, permanent stormwater

[130] MPCA, Clearwater River, retrieved from https://www.pca.state.mn.us/watershed-information/clearwater-river.
[131] SPA, p. 77
[132] SPA, Appendix G. AIMP.

management that will be implemented during construction and through the life of the project. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction.

- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".

4.7.5 Wetlands

The ROI for wetlands is the land control area. The impact intensity level is anticipated to be minimal. Although there is a potential for wetlands to be indirectly affected, direct impacts are not expected. These impacts will be short-term, of a small size, and localized. Impact can be mitigated.

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated during much of the growing season). Wetland types include marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.[133]

Wetlands are important to the health of waterways and communities that are downstream. Wetlands can be one source of hydrology in downstream watercourses and water bodies, detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetland health also has economic impacts because of their key role in fishing, hunting, agriculture, and recreation. These large infrastructure projects could temporarily or permanently impact wetlands if these features cannot be avoided through project design. During construction, temporary disturbance of soils and vegetative cover could cause sediment to reach wetlands which could in turn affect wetland functionality.

The applicant assessed the potential for wetlands within the solar farm footprint through a formal wetland delineation in June and July of 2022. Additional wetland analysis, including wetland mapping and identification, was conducted for this EA using desktop reviews of available resource (i.e., National Wetlands Inventory (NWI) data, MNDNR Public Waters Inventory, etc).

The wetland mapping identified approximately 62.51 acres of wetlands within the project site. There are no PWI features mapped within or adjacent to the land control area.[134] Wetlands were further identified to determine type and acerage using NWI data. Wetland types include Freshwater Emergent Wetlands (Seasonally Flooded/Saturated), Freshwater Forested/Shrub wetlands (Hardwood and Shrub),

This EA uses the National Wetland Inventory for Minnesota (NWI-MN) to allow for comparison of wetland type between the Solar Facility Units (Table 15). This comparison includes portions of wetlands that have been delineated for this project. The NWI-MN is a publicly available GIS database that provides information on the location and characteristics of wetlands in Minnesota. The inventory is a 2008 update of the USFWS National Wetlands Inventory that was completed for Minnesota in the 1980s. Wetlands listed on the NWI-MN may be inconsistent with local wetland conditions; however,

[133] USEPA. 2022. *What is a Wetland* https://www.epa.gov/wetlands/what-wetland
[134] SPA, p. 76

the NWI-MN provides an accurate and readily available database of wetland resources within the land control area that can be used to identify wetlands at the solar facility.

Table 15. NWI-MN Wetlands in Project Footprint[135]

Wetland type	Acres
Freshwater Emergent	3.64
Freshwater Forested/Shrub	10.72
Riverine	48.15
Total	62.51

Plummer Solar contracted with Barr Engineering and completed an onsite wetland delineation in June and July of 2022 across the entire land control area, and over a mile outside the project area, delineating wetlands totaling approximately 111.08 acres. Out of the wetlands delineated, 11.68 acres are within the land control area. Correspondence with USACE and Red Lake County SWCD occurred to approve wetland delineation before the Site Permit Application was submitted.[136]Table 16. Delineated Wetlands Table 16 summarizes delineated wetlands both within and outside of the areas of land control, which were identified using GIS shapefiles provided from Plummer Solar's documented wetland delineation.

Table 16. Delineated Wetlands

Wetland type	Acres in land control area	Total acres delineated
Freshwater Emergent	2.55	2.58
Freshwater Emergent (farmed)	4.65	4.73
Freshwater Forested/Shrub	0.66	1.06
Fresh (wet) Meadow	3.83	47.50
Shallow Marsh	--	0.42
Total	11.69	111.08

Potential Impacts

The NWI-MN mapping identified approximately 62.51 acres Freshwater Emergent, Freshwater Forested/Shrub, and Riverine wetland. Most of this is a Riverine wetland that exists within a ditch between two blocks of solar arrays. Outside of this ditch, small pockets of Freshwater Emergent and Freshwater Forested/Shrub wetlands are found sparingly throughout the land control area. Plummer Solar's wetland delineation identified approximately 11.69 acres of wetland within the project site, and 111.08 acres of wetland in the nearby area outside of the project.

[135] DNR. National Wetland Inventory of Minnesota. (2015). https://resources.gisdata.mn.gov/pub/gdrs/data/pub/us_mn_state_dnr/water_nat_wetlands_inv_2009_2014/metadata/metadata.html#Distribution_Information

[136] SPA, Appendix D. Agency and Stakeholder Correspondence.

Although wetlands have been identified within the project area, the preliminary site layout for the solar facility avoids locating solar arrays and associated facilities in wetlands. However, the preliminary site layout includes approximately 0.07 acres of roads sited within wetlands. There may be potential for temporary, short-term impacts to wetlands that occur during installation of the electrical collection lines and temporary access roads.

MITIGATION

The project site layout has been designed to avoid all wetlands delineated to date. If wetland impacts are required for the final layout, coordination with the appropriate agency, such as the USACE under Section 404 and 401 of the Federal Clean Water Act (CWA) and the Red Lake County SWCD under the Minnesota Wetland Conservcation Act (WCA), would occur priort to construction. If unavoidable wetland impacts take place, impacts will be replaced in accordance with Section 404 of the Federal CWA and the Minnesota CWA.[137]

Section 4.3.13 of the DSP (**Appendix C**) generally prohibits placement of the solar energy generating system or associated facilities in public waters and public waters wetlands. The permit condition does allow for electric collector or feeder lines to cross or be placed in public waters or public waters wetlands subject to permits and approvals by the DNR and the USACE, and local units of government as implementers of the WCA.

4.7.6 Vegetation

The ROI for vegetation is the land control area. The solar facility will convert row crop farmland to perennial vegetation for the life of the project. Potential impacts of the solar facility can be mitigated through development of a VMP.

The solar facility is located in the Lake Agassiz, Aspen Parklands Section (223Na) subsection of the Tallgrass Aspen Parklands Province. This subsection is a part of an extensive lake plain created by Glacial Lake Agassiz. The area was historically extensive forested peatlands to the east and tallgrass prairie mixed with stands of quaking aspen to the west. Pre-Eurpoean settlement vegetation consisted of a combination of aspen savanna, tallgrass prairie, wet prairie, and dry gravel prairie (on gravelly beach ridges). Floodplain forests of silver maple, elm, cottonwood, and ash occurred along rivers and streams. Fire was the most common natural disturbance before settlement, and has allowed woodlands to develop from what was previously oak openings or brush prairies. Little of the natural vegetation from pre-European settlement is present today, as the current land-use in the project area is predominately agricultural.[138]

POTENTIAL IMPACTS

Construction of the solar facility will eliminate vegetative cover and create impermeable surfaces at access roads and inverter skids. Removal of vegetative cover exposes soils and could result in soil erosion. Temporary or permanent removal of vegetation also has the potential to affect wildlife habitat. Agricultural land within the solar facility would be converted to perennial, low growing

[137] SPA, p. 77
[138] DNR (n.d.) *Ecological Classification System: Ecological Land Classification Hierarchy*, retrieved from: https://www.dnr.state.mn.us/ecs/index.html

vegetative cover, resulting in a net increase in vegetative cover for the life of the project. Under the arrays, a low growing grass and clover mix will primarily be used in combination with a native shortgrass priarie mix used in areas that won't shade the panels. Native prairie seed mixes that include both native grasses and wildflowers will be used at the solar facility in the corridor areas. In wetland and stormwater management units, native seed mixes that contain plants well suited for soils frequently becoming saturated will be used.[139] Once established, vegetation would be maintained using best practice guidance from Minnesota's Board of Water and Soil Resources (BWSR) to meet the Habitat Friendly Solar standards.[140]

Construction activities at the solar facility could introduce or spread invasive species and noxious weeds and the early phases of site restoration and seeding of native species can result in populations of non-native and invasive species on site.

MITIGATION

Several sections of the DSP (**Appendix C**) address impacts to vegetation:

- Section 4.3.17 requires the permittee to develop a vegetation management plan (VMP) in coordination with state agencies and to file the VMP prior to construction. The applicant has prepared a draft VMP as Appendix H of the Site Permit application. The VMP must include the following:
    - Management objectives addressing short term (Year 0-3, seeding and establishment) and long term (Year 4 through the life of the permit) goals.
    - A description of planned restoration and vegetation management activities, including how the site will be prepared, timing of activities, how seeding will occur (broadcast, drilling, etc.), and the types of seed mixes to be used.
    - A description of how the site will be monitored and evaluated to meet management goals.
    - A description of the management tools used to maintain vegetation (e.g., mowing, spot spraying, hand removal, fire, grazing, etc.), including the timing and frequency of maintenance activities.
    - Identification of the third-party (e.g., consultant, contractor, site manager, etc.) responsible for restoration, monitoring, and long-term vegetation management of the site.
    - Identification of on-site noxious weeds and invasive species (native and non-native) and the monitoring and management practices to be utilized.
    - A site plan showing how the site will be revegetated and that identifies the corresponding seed mixes. Best management practices should be followed concerning seed mixes, seeding rates, and cover crops.
- Section 4.3.18 requires the permittee to develop an AIMP which details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to

[139] SPA, Appendix H. VMP.
[140] SPA, p. 90

ensure the project is designed, constructed, operated, and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use. Plummer Solar has included a draft AIMP as Appendix G of its application.

- Section 4.3.15 requires the permittee to minimize the number of trees removed and to leave existing low growing species in the ROW undisturbed to the extent possible, or to replant to blend in with adjacent areas following construction.

4.7.7 Wildlife and Habitat

The ROI for non-avian wildlife and their habitats is the land control area, the ROI for birds is the local vicinity. Potential impacts may be positive or negative and are species dependent. Long-term, minimal positive impacts to small mammals, insects, snakes, etc. would occur. Impacts to large wildlife species, for example, deer, will be negligible. Significant negative impacts could occur to individuals during construction and operation of the project.

Once restored, the land control area will provide native habitat for the life of the project. The project does not contribute to significant habitat loss or degradation or create new habitat edge effects. The introduction of PV panels and fencing creates the potential for bird collisions and funneling wildlife towards roads in certain areas. Potential impacts can be mitigated in part through design and BMPs. The impact intensity level is expected to be minimal.

The project landscape is dominated by agriculture and developed areas (roads, homes, and farmsteads). Landscape types and vegetation communities vary throughout the local vicinity. Fencerows and woodlots, as well as small pockets of wetlands and grassland, provide habitat for terrestrial and avian wildlife.

Wildlife utilizing the land control area are common species associated with disturbed habitats and are accustomed to human activities (e.g., agricultural activities and road traffic) occurring in the area. Mammals, reptiles, amphibians, and insects are present. These species include white-tailed deer, red fox, striped skunk, raccoon, coyote, garter snake, and a variety of insects including native bees, butterflies, and moths.

Avian species common to the site include the Red-tailed Hawk, Great Horned Owl, Bobolink, Short-Eared Owl, Bald Eagle, Marbled Godwit, Canada Goose, American Crow, Mourning Dove, and Eastern Kingbird. The Project is located within the Mississippi Flyway, which is a major north-south migration route. The site is located within the Prairie Potholes Bird Conservation Region.[141] There are no Important Bird Areas (IBA) designated by the National Audubon Society within the site; the Goose Lake Swamp state IBA is located approximately 20 miles northwest of the project, and the Glacial Ridge Global IBA is located approximately 14 miles southwest of the project.[142]

POTENTIAL IMPACTS

The impact intensity level is expected to be minimal. Impacts could be positive or negative and depend on species type. Potential impacts will be short- and long-term and can be mitigated.

[141] SPA, pp. 78-80
[142] Audubon Minnesota, retrieved from: https://mn.audubon.org/node/4281.

Non-Avian Wildlife Individuals will be displaced to adjacent habitats during construction. Because the land control area does not provide critical habitat, this should not impact life cycle functions, for example, nesting. Direct significant impacts to individuals might occur, that is, small species might be crushed or otherwise killed during construction. Population level impacts are not anticipated.

The largest impact to wildlife associated with solar facilities is fencing. Project fencing will be 8 ft-high chain link fence topped with three strands of high-tensile wire. Although deer can jump many fences, they can become tangled in both smooth and barbed-wire fences, especially if the wires are loose or installed too closely together.[143] Predators can use fences to corner and kill prey species.[144]

Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact wildlife populations. Wildlife entanglement and death from plastic netting and other plastic materials has been documented in birds, fish, mammals, and reptiles.[145]

Reduced pesticide use, as compared to agricultural production, has the potential to benefit insects, including pollinators, and smaller wildlife such as rodents, birds, insects, and reptiles. Revegetating the site with pollinator friendly species will also benefit these species.

Birds Bird injuries or mortality may occur due to lack of fencing visibility. Raptors in pursuit of prey may be vulnerable to the nearly invisible wire strands, although other low flying birds such as grouse and owls are also vulnerable to fence collisions.

Risks to birds have been identified near PV solar facilities. Preliminary findings in one report, based on limited data, suspect the danger is this appearance of water causing migrating birds to attempt to land, consequently incurring trauma and related predation.[146]

Habitat There are no DNR WMAs or migratory waterfowl feeding and resting, or USFWS Waterfowl Production areas within one mile of the site. The Emardville WMA is located approximately two miles north of the project site. There is the Northern Terrace Forest located approximately 1.4 miles north of the project, which DNR characterizes as an MBS site of moderate biodiversity significance and containining non-prairie native plan communities.[147]

Wildlife habitat in the area is currently highly fragmented. The row crop habitat at the solar facility being converted is not crucial to wildlife populations, although the land control area may be used as a travel corridor or, occasionally, as a food source (for example, standing corn). Once restored, the developed area within the solar facility will provide herbacous cover and native habitat for the life of

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[143] Colorado Division of Wildlife. *Fencing with Wildlife in Mind.* (2009). https://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf, p.. 3.

[144] Marcel Huijser, et al. *Construction Guidelines for Wildlife Fencing and Associated Escape and Lateral Access Control Measures.* (April 2015). http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25%2884%29_FR.pdf, page 27.

[145] DNR. *Wildlife-friendly Erosion Control*. (2013).http://files.dnr.state.mn.us/eco/nongame/wildlife-friendly-erosion-control.pdf.

[146] USFWS Forensics Lab. *Avian Mortality at Solar Energy Facilities in Southern California*. (2014). http://www.ourenergypolicy.org/wp-content/uploads/2014/04/avian-mortality.pdf

[147] SPA, p. 83

the project. This change might be attractive to some species, and not others. Fencing will restrict ingress and egress of larger wildlife, and habitat benefits will be limited to small mammals, grassland birds, reptiles insects, etc. accustomed to human disturbance. The VMP anticipates that mowing will be done 1-2 times during the growing season over the first few years of the project. For long term maintenance, mowing or sheep grazing will be used to maintain vegetative health and prevent seed spray.[148] Overall, the project does not contribute to significant habitat loss or degradation or create new habitat edge effects.

4.7.7.1 MITIGATION

Several sections of the DSP (**Appendix C**) specify measures that will minimize impacts to wildlife:

- Section 4.3.16 requires use of "site restoration and management practices that provide for native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators".
- Section 4.3.32 requires the permittee to coordinate with the DNR to ensure that the fence used in the project minimizes impacts to wildlife
- Section 8.14 requires permittees to report "any wildlife injuries and fatalities" to the Commission on a quarterly basis.

Other potential mitigation measures include:

- Siting facilities away from wildlife movement corridors can avoid or minimize impacts to wildlife movement.
- Checking open trenches and removing any wildlife caught in trenches before backfilling mitigates impacts.
- Once permanent vegetation is established, restricting mowing from April 15 to August 15 to improve the potential for ground nesting habitat.

4.7.8 Rare and Unique Resources

The ROI for rare and unique resources is the local vicinity. The impact intensity level is anticipated to be minimal. Impacts could be both short and long term and could be positive (e.g., through introduction of habitat), or negative (e.g., by removing trees during migratory season). Impacts can be mitigated.

Construction and operation of solar facilities may adversely impact rare and unique resources through the taking or displacement of individual plants or animals, invasive species introduction, and habitat loss. Conversely, in some cases solar sites can be managed to provide habitat. For example, the introduction of native vegetation into a landscape otherwise dominated by cultivated row crops could create habitat for pollinators, such as the rusty patched bumble bee.

The Minnesota DNR classifies rare plant or animal communities across the state. These include Scientific and Natural Areas, High Conservation Value Forest, Minnesota Biological Survey (MBS) Native Plant Communities, and MBS Sites of Biodiversity Significance

[148] SPA, Appendix H. VMP.

The Division of Ecological and Water Resources within DNR manages the Natural Heritage Information System (NHIS). The NHIS "provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new information becomes available and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and conservation of these features."[149] NHIS data includes federally endangered, threatened, or candidate plant species, and endangered or threatened animal species. The system also includes state endangered, threatened, or special concern species. The NHIS database a source of information, but not the sole source for identifying these resources, as some areas surveys have not been conducted extensively or recently making.

The USFWS provides information for use in National Environmental Policy Act (NEPA) documents, and reviews and provides comments on these documents. Through this process, the USFWS seeks to ensure that impacts to plant and animal resources are adequately described, and necessary mitigation is provided. One such resource is the distribution lists of federally listed threatened, endangered, and candidate species by county.

The EA does not map federal- or state-listed species found in the NHIS database, because DNR requires that public display of NHIS data either mask the identity or location of rare features due to the vulnerability of some species to exploitation. Moreover, the NHIS database masks the occurrence of rare species of by randomly incorporating their location into a larger map polygon.

POTENTIAL IMPACTS

Natural Communities

Minnesota Biological Survey (MBS) systematically collects, interprets, and provides baseline data on the distribution and ecology of rare plants, rare animals and native plant communities.[150] The MBS uses four classifications denoting the level of biological diversity to rank sites:[151]

- **Below**. Sites lack occurrences of rare species and natural features or do not meet MBS standards for outstanding, high, or moderate rank. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher- quality natural areas, areas with high potential for restoration of native habitat, or open space.
- **Moderate**. Sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes.
- **High**. Sites contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.

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[149] Department of Natural Resources (n.d.) *Natural Heritage Information System*, http://www.dnr.state.mn.us/nhnrp/nhis.html

[150] DNR. *Minnesota County Biological Surveys*, http://www.dnr.state.mn.us/eco/mcbs/index.html

[151] DNR, *Minnesota Biological Survey*, MBS Site Biodiversity Significance Ranks, https://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html.

- **Outstanding**. Sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes.

There are no MBS sites of moderate, high, or outstanding biodiversity significance within the project area. There is the Northern Terrace Forest located approximately 1.4 miles north of the project, which DNR characterizes as an MBS site of moderate biodiversity significance and containining non-prairie native plan communities.[152]

Rare Species

Northern Long Eared Bat

The Northern Long Eared Bat (NLEB) is a federally listed species and state listed species of concern. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark or in cavities or crevices of both live and dead trees. The spread of white-nose syndrome across the eastern United States has become the major threat to the species. Activities that might impact this species include, but are not limited to, any disturbance to hibernacula and destruction or degradation of habitat including tree removal. While the land control area is primarily agricultural lands with little forested habitat, the NLEB is limited to shelterbelts or windbreaks. The USFWS determined the Project is not likely to result in an unauthorized take of the NLEB and "may affect, but not likely to adversely affect" NLEB.[153] According to the MNDNR and USFWS, there are no known hibernacula in Red Lake County or in the counties surrounding Red Lake County, which include Pennington, Polk, and Clearwater counties. The nearest known roost tree is located over 20 miles east of the project in Clearwater County. The preferred mitigation strategy to avoid impacts to the NLEB is avoidance of tree-clearing to the extent possible. When tree clearing is necessary, it should be done outside the pup rearing season from June 1 to July 31 and outside the active NLEB season from April 1 to October 31.

Monarch Butterfly (Danaus plexippus)

The monarch butterfly is a federal candidate species. The species is common throughout Minnesota during summer months and is most frequently found in habitats where milkweed and native plants are common, including roadside ditches, open areas, wet areas, and urban gardens.[154] Due to the agricultural landscape, suitable monarch butterfly habitat is limited in the land control area, and milkweed was not identified during the 2022 wetland delineation.

Bald Eagles and Golden Eagles

In Minnesota, the bald eagle nesting season is generally January through early July. Bald eagles are primarily found near rivers, lakes, and other waterbodies in remote and, more recently, within metropolitan areas.[155]

Bald eagles are afforded additional protections under the Bald and Golden Eagle Protection Act, which is administered by the USFWS. Bald eagle incidental take permits and nest removal permits are

[152] SPA, p. 83
[153] SPA, p 81
[154] DNR, *Monarch Butterfly* https://www.dnr.state.mn.us/insects/monarchbutterfly.html
[155] DNR, *Bald Eagles in Summer*. https://www.dnr.state.mn.us/birds/eagles/summer.html

considered to be voluntary permits, meaning a project proposer must make the determination to pursue a permit based on the respective risk of their project's potential to take a bald eagle.

Bald eagles typically nest in mature trees near large lakes or streams. Nesting habitat suitable for bald eagles is not present within the Project Site and the closest suitable nesting habitat is associated with the Clearwater River, approximately 1.5 miles north and northwest of the Project Site. The USFWS will coordinate appropriate mitigation measures for bald eagles for the project. Mitigation measure may include setbacks from nests, timing restriction for construction activities, and possibly seeking a USFWS permit for removal of a nest.

Short-eared owl

The short-eared owl is a state listed species of special concern. The short-eared owl inhabits open areas such as native prairie, pasture, grasslands, sedge wetlands, shrub swamps, and peatlands. They are most often found in extensive tracts of habitat, rather than small, isolated patches, particularly during the breeding season. This species has been documented as present within the edge of the land control area. Common mitigation to avoid impacts to this species includes timing of activites to occur outside of migratory bird nesting season (April – July).

Marbled godwit

Marbled godwits prefer native grasslands with sparse to moderate cover, adjacent to a complex of wetlands. They nest in short upland grasslands or in cropland stubble that is within or close to large expanses of grassland. This species has not been documented within the land control area, however, it has been documented approximately 0.8 miles from the project site. Common mitigation to avoid impacts to this species includes timing of activites to occur outside of migratory bird nesting season (April – July).

MITIGATION

Techniques for minimizing impacts to wildlife and vegetation also minimize impacts to rare species. Avoiding identified areas of species occurrence or preferred habitat is the preferred mitigation measure.

The DSP (**Appendix C**) proposes special conditions related to the NLEB, the Bald Eagle, the short eared owl, and the marbled godwit.

- Section 5.4 requires the permittee to comply with the USFWS guidance and requirements in effect regarding NLEB, including tree clearing restrictions if applicable.
- Section 5.5 requires the permittee to avoid impacts to prairie, wetlands, grasslands, shrub swamp, peatlands, and other suitable short-eared owl and marbled godwit habitat during the April through July migratory season, and to coordinate with DNR if impacts to habitat will occur during the migratory season.
- Section 5.6 requires the permittee to file documentation authorizing any Bald Eagle nest removal prior to construction.

4.7.9 Climate Change

The project will help to shift energy production in Minnesota and the upper Midwest toward carbon-free sources. Construction emissions will have a short- term negligible increase in

greenhouse gases that contribute to climate change. Overall, the project will generate energy that can be used to displace energy otherwise generated by carbon-fueled sources. The total GHG emissions produced by construction and operation of the project will be minimal when compared to the reduction in GHG emissions long-term. The project's design incorporates design elements that minimize impacts from the increase in extreme weather events such as increase flooding, storms, and heat wave events that are expected to accompany a warming climate.

Climate change refers to any significant change in measures of climate lasting for an extended period. Greenhouse gases (GHG) are gaseous emissions that trap heat in the atmosphere and contribute to climate change. These emissions occur from natural processes and human activities. The most common GHGs emitted from human activities include carbon dioxide, methane, and nitrous oxide. A change in climate can have a wide range of impacts on living species, as well as infrastructure, and may create compounding weather related events. An increase of extreme weather events, such as flooding, storms, and heat waves, is expected to accompany a warming climate.

In 2020, the electricity sector was the second largest source of Minnesota GHG emissions at 15.8 million tons of 137 million tons, or 11.5%.[156] GHG from electricity generation have decreased by about 60% in Minnesota since 2005 due to a shift in generation to lower- and non-emitting sources and an increase in end-use energy efficiency.[157]

POTENTIAL IMPACTS

General

The MNDNR Minnesota Climate Trends Tool was used to determine current climate conditions for Red Lake County.[158] Annual average temperature trends show a temperature increase of 0.22 °F per decade from 1895 to the present, and 0.36 °F per decade from 1970 to present. For precipitation, total annual precipitation has increased at a rate of 0.07 inches per decate from 1895 to present, and decreased at a rate of -0.02 inches per decade from 1970 to present.[159]

The MNDNR Minnesota Climate Explorer tool was also used to project climate conditions for Red Lake County. Temperature models were created to project climate data for two scenarios, Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP is a measure adopted by the Intergovernmental Panel on Climate Change to represent various GHG concentration pathways. The numbers (i.e., 4.5 and 8.5) represent the amount of net radiative forcing the earth receives in watts per meter squared, where a higher RCP signifies a more intense GHG effect resulting in a higher level of warming. RCP 4.5 represents an intermediate scenario where emissions begin to decrease around 2040 and RCP 8.5 represents a scenario with no emissions reductions through 2100.[160]

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[156] Minnesota Pollution Control Agency, Greenhouse gas emissions data, retrieved from: https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory

[157] Id.

[158] Minnesota Climate Trends Map, retrieved from: https://arcgis.dnr.state.mn.us/ewr/climatetrends/

[159] SPA, p. 86

[160] Noe, Ryan R; Keeler, Bonnie L; Twine, Tracy E; Brauman, Kate A; Mayer, Terin; Rogers, Maggie. (2019). Climate change projections for improved management of infrastructure, industry, and water resources in Minnesota. Retrieved from the University of Minnesota Digital Conservancy, https://hdl.handle.net/11299/209130.

The climate models predict that under RCP 4.5, the average temperature for Red Lake County is projected to increase by approximately 4 °F by Mid-Century (2040 to 2059) compared to current conditions (1980 to 1999). Late-Century (2080-2099) air temperature is projected to increase by approximately 6 °F for RCP 4.5, and approximately 9 °F for RCP 8.5. Mid-Century annual precipitation is projected to increase by approximately three inches for RCP 4.5. Late-Century annual precipitation is projected to increase by approximately four inches for RCP 4.5, and six inches for RCP 8.5.

Greenhouse gases

Construction activities will result in short-term increases in GHG emissions from the combustion of fossil fuels in construction equipment and vehicles. The project's construction emissions are an insignificant amount relative to Minnesota's overall emissions of approximately 137 million tons in 2020.[161] Potential impacts due to construction GHG emissions are anticipated to be negligible.

Other GHG emissions will be created by land use change from the loss of existing natural carbon sinks in the area. Once operational, the project will generate minimal GHG emissions. Emissions that do occur would result from vehicle usage to and from the solar array and substation for maintenance and operation of the substation and switchyard. GHG emissions for project construction and operation are estimated to be approximately 1437.79 metric tons of CO_2 annually. Emissions are comprised of CO_2 from mobile combustion (7.96 tons), from electrical consumption (20.47 tons), and from land use change (1,409.36 tons).[162] The majority of land-use emissions will occur during construction due to the change from cropland and wetlands to settlement, however the establishment of perennial vegetation and prairie can reduce this impact.

If electrical energy from the project displaces energy that would otherwise be generated by carbon-fueled power plants (e.g., coal, natural gas), the project could reduce GHG by approximately 95,500 metric tons of CO_2 equivalent annually. Thus, compared to non-renewable energy generation, the project would be beneficial with respect to GHG emissions. Total GHG emissions resulting from construction and operation of the project are anticipated to be minimal when compared to the long-term reduction in GHG emissions facilitated by the project.

Climate and weather

Tree and vegetation loss from construction eliminates related climate resilience benefits, leading to more intense runoff during storms or flooding (thus increasing erosion and reducing water retention), increased heat extremes, and potential reductions in air quality. Removal of or impacts to wetlands due to construction eliminates the ability for the land to retain and absorb stormwater, leading to more intense stormwater runoff and nutrient loading. Revegetation is expected to offset effects, therefore impacts should be temporary and minimal.

Plummer Solar used online climate screening tools to determine storm intensity impacts. The EPA Climate Resilience Evaluation and Awareness Tool anticipates an increase in 100-year storm intensity of 2.6 to 13 percent in 2035, and 4.5 to 25 percent in 2060 for the project area. Because of this, there is potential for waterways to be subject to more erosion. Periods of drought may also be possible. The

[161] MPCA, *Greenhouse gas emissions data.* https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory
[162] SPA, Appendix L GHG Calculations

EPA Streamflow Projections Map anticipates a change in average streamflow of the Clearwater River by a ratio of 1.8 (90th percentile) under wetter conditions, and a ratio of 0.89 (10th percentile) under drier conditions from 2071 to 2100 (RCP 8.5) compared to baseline historical flow (1976 to 2005). Because the river is located approximately 1.5 miles north of the project, minimal impact from river flooding is anticipated.

A warming climate is expected to cause increased flooding, storms, and heat wave events. These events, especially an increased number and intensity of storms, could increase risks to the project. More extreme storms also mean more frequent heavy rainfall events, which can cause localized soil erosion or flooding. Flooding could damage the project's electrical collection system including inverters and collection wiring. Climate and weather impacts are considered in the design of the facility and include impacts from extreme storms such as stormwater runoff, strong winds and hail. Based on local hydrology and topography, there is potential for soils to become rutted due to increased rain events. Rainfall infiltration is calculated to increase once the project is completed. However, native perennial vegetation will replace seasonal row crops across most of the site, creating deep root systems that are able to improve water infiltration and mitigate stormwater runoff.[163]

The FEMA National Risk Index[164] rates Red Lake County as having "very low" risk for hail.
The solar panel modules selected for the project are designed to withstand wind and hail events. The tracking systems are also designed to automatically stow the panels in the safest position based on the weather conditions (wind, hail, flooding, deep snow, etc.). For example, panels are stowed in a nearly vertical position during hail events by re-orienting the trackers, which limits direct impacts between hailstones and the panels.

MITIGATION

Mitigation to reduce emissions during construction is discussed in the Air Quality section of this EA. Strategies to reduce emissions include keeping vehicles in good working order, which will reduce the amount GHG emissions from diesel or gasoline.

Project developers can employ location, design, and construction strategies to mitigate impacts resulting from a warmer, wetter, and more energetic climate by:

- Avoiding sites with high probability for extreme weather events to the extent possible.
- Designing solar panels and solar arrays to withstand stronger storms and winds.
- Planning for the potential repair and replacement of solar arrays damaged by storms.
- Designing the project's stormwater system to prevent flooding during heavy rainfall events.
- Designing the project's electrical collection system to be resistant to flooding damage.

Plummer Solar states that erosion during construction activities will be minimized through the implementation of the SWPPP, mitigating the additional erosion impacts due to the anticipated

[163] SPA, Appendix H. VMP.
[164] FEMA National Risk Index. https://hazards.fema.gov/nri/

increase in 100-year storm intensity. Appropriate permits would be obtained prior to appropriating water during construction or operation, if needed.[165]

4.8 Unavoidable Impacts

Resource impacts are unavoidable when an impact cannot be avoided even with mitigation strategies.

Potential impacts and the possible ways to mitigate against them are discussed in this chapter. However, even with mitigation strategies, certain impacts cannot be avoided. Most adverse unavoidable impacts are associated with construction; therefore, they would be temporary.

Unavoidable adverse effects associated with construction of the project (in some instances a specific phase of construction) would last through construction and include:

- Fugitive dust.
- Noise disturbance to nearby residents and recreationalists.
- Visual disturbance to nearby residents and recreationalists.
- Soil compaction and erosion.
- Vegetative clearing (loss of shelter belts).
- Disturbance and temporary displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed.
- Minor amounts of marginal habitat loss.
- Possible traffic delays.
- Minor GHG emissions from construction equpment and workers commuting.

Unavoidable adverse impacts associated with the operation would last as long as the life of the project, and include:

- Visual impacts of the project.
- Cultural impacts due to a change in the sense of place for local residents.
- Loss of land for agricultural purposes.
- Injury or death of birds that collide with PV panels.
- Injury or death of birds and mammals from fencing.

4.9 Irretrievable or Irreversible Impacts

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use; an irretrievable commitment of resources means the resource is not recoverable for later use by future generations.

Irreversible and irretrievable resource commitments are primarily related to project construction, including the use of water, aggregate, hydrocarbons, steel, concrete, wood, and other consumable resources. Some, like fossil fuel use, are irretrievable. Others, like water use, are irreversible. Still others might be recyclable in part, for example, the raw materials used to construct PV panels would be an irretrievable commitment of resources, excluding those materials that may be recycled at the

[165] SPA, p. 87

end of the panels' useful life. The commitment of labor and fiscal resources to develop, construct, and operate the project is considered irretrievable.

4.10 Resource Topics Receiving Abbreviated Analysis

Resource topics that will have negligible impacts from the project and that do not impact the Commission's site permit decision receive less study and analysis.

Many environmental factors and associated impacts from a project are analyzed during the environmental review process. However, if impacts are negligible and will not impact the permit decision, those resource impacts receive less study and analysis. The following resource topics meet this threshold, which is based on information provided by the applicant, field visits, scoping comments, environmental analysis, and staff experience with similar projects.

4.10.1 Displacement

Displacement can occur when residences or other buildings are located within a proposed site or right-of-way. If the buildings would potentially interfere with the safe operation of a project, they are typically removed from the site or ROW and relocated. Displacements from large energy facilities are rare and are more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible than in rural areas where there is more room to adjust site boundaries or ROWs to accommodate the proposed energy facility.

There are no residences, business, or structures such as barns or sheds located within the area of land control, and none will be displaced by the project. No mitigation is proposed.

4.10.2 Communications

Electronic interference from the proposed project is not anticipated. The project area is served by about 15 AM and FM radio stations or digital television channels. There are no radio, microwave, or television towers are located within the boundary of the solar facility. There are no cell phone towers located within 30 miles of the land control area. Cellular phone service in the service area is provided by national operators, and base stations are used for wireless devices as a central point for communication. There are eight fixed private base stations within one mile of the land control area.

Because the solar facilities are relatively low (less than 20 feet tall), they are well below the line of site used in many communication system signals. Electronic interference associated with communications infrastructure is related to a phenomenon known as corona. Impacts are not expected, because anticipated electric fields are below levels expected to produce significant levels of corona.

Section 4.3.24 of the DSP requires the permittee to take whatever action is feasible to restore or provide equivalent reception should interference occur to "radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices" as a result of the project. Additional mitigation is not proposed.

4.10.3 Implantable Medical Devices

Electromagnetic fields (EMF) might interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Impacts to implantable medical devices and persons using these devices are not expected to occur, but, if they did occur, moving away from the project would return the pacemaker to normal operation. Section 4.3.30 of the

DSP requires the permittee to provide educational materials about the project to adjacent landowners. Additional mitigation is not proposed.

4.10.4 Forestry

Active forestry operations, including commercial timber harvest, woodlots, or other forestry resources do not occur within the land control area. Impacts to forestry operations will not occur.

4.10.5 Mining

There are no gravel pits within the area of land control. The closest gravel pits are located approximately two miles west and southwest from the project site.

Construction of the project will require the use of sand and aggregate for backfill and access roads. The demand for sand and gravel will be temporary and is not expected to require new or expanded sand or aggregate operations.

Impacts to mining will not occur and no mitigation is proposed.

4.11 Cumulative Potential Effects

Cumulative potential effects result from the incremental effects of a project in addition to other projects in the environmentally relevant area.

Minnesota Rule 4410.0200, subpart 11a, defines "cumulative potential effects," in part, as the "effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects ... regardless of what person undertakes the other projects or what jurisdictions have authority over the project."

The "environmentally relevant area" includes locations where the potential effects of the project coincide with the potential effects of other projects to impact the elements studied in this EA.

Consideration of cumulative potential effects is intended to aid decision-makers so that they do not make decisions about a specific project in a vacuum. Effects that may be minimal in the context of a single project may accumulate and become significant when all projects are considered.

4.11.1 Analysis Background

The ROI for cumulative potential effects varies across elements and is consistent with the ROI identified in potential impacts and mitigation throughout this document. Cumulative potential effects—where they coincide—increase or decrease the breadth of the impact to the resources and elements studied in potential impacts and mitigation. This may or may not change the impact intensity level assigned to the resource or element.

Cumulative potential effects are impacts to the environment that results from "the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually

planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects."[166]

The "environmentally relevant area" includes locations where the potential effects of the project coincide with the potential effects of other projects to impact the elements studied in this EA. Generally, this area includes the ROI for the different resource elements.

Commerce staff contacted local governments, The Red Lake Watershed District, MnDOT, and the Environmental Quality Board's interactive project database to identify foreseeable projects.

As part of the MnDOT 2028-2033 Capital Highway Investment plan, there will be a resurfacing of Highway 59 in Thief River Falls, planned for 2029. This project is located approximately 0.7 miles west of the Plummer Solar project. Currently, MnDOT is conducting a corridor study to improve pedestrian and vehicle safety, highway access, stormwater drainage, and pavement condition on the highway.

As part of Red Lake County's five year construction program, there will be an overlay of CSAH 1 (180th St SE) between Trunk Highway (TH) 59 and CSAH 10, planned for 2025. This project will bisect the project site.

Cumulative effects are discussed here for projects that are reasonably foreseeable in the next five years in the project area. It is assumed that the construction-related impacts of these projects are short-term, for example, construction impacts will cause local disturbances, such as increased noise levels, and traffic delays/and reroutes. Thus, the discussion here is focused on the potential long-term impacts of these projects.

Where cumulative effects are anticipated, a written description is provided. Where cumulative potential effects are not anticipated no further analysis is provided. For the purposes of this EA, actions that have occurred in the past and their associated impacts are considered part of the existing environmental and were analyzed in this section.

4.11.2 Human Settlement

Cumulative potential effects on human settlements are anticipated to be moderate. Some projects would have positive effects on human settlements by improving transportation and safety. The anticipated transportation projects are largely improvements in existing roadways, so aesthetic impacts are anticipated to be minimal.

4.11.3 Public Health and Safety

Cumulative potential effects on public health and safety are anticipated to be minimal to slightly positive. Impacts on public health and safety as a result of the Plummer Soar Project are anticipated to be minimal (Section 4.4.2). Road and highway related projects are being undertaken to maintain and improve local roads to ensure their safe operation and the public's health and safety.

[166] Minn. R. 4410.0200, subp. 11a

4.11.4 Land-based Economies

Cumulative potential effects on land-based economies are anticipated to be minimal. The project area is within largely agricultural land, and there are no anticipated land-based projects planned in the community outside of the Plummer Solar project.

4.11.5 Archaeological and Historical Resources

Because archaeological resources are unidentified, cumulative potential effects are unknown. With proper mitigation measures, impacts to these resources can be minimized.

4.11.6 Natural Resources

Cumulative potential effects on the natural environment are anticipated to be minimal to moderate. The only foreseeable projects are along roadways resulting in minimal loss of high-quality habitat. Impacts are limited along roadways by the use of existing infrastructure ROW. Wildlife might be inadvertently harmed or killed during construction. Potential impacts can be mitigated. The overall impact intensity level is expected to remain minimal.

4.11.7 Rare and Unique Resources

Cumulative potential effects on rare and unique natural resources are uncertain. There are relatively few rare and unique species in the project area (Section 4.7.8). As the identified projects are improvements are along existing roadways, these areas generally do not provide habitat for rare and unique species, nor do they typically support rare communities.

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