Environmental Assessment:

Coneflower Solar Project

The Human and Environmental Impacts of Constructing and Operating the

235 MW Coneflower Solar Project

March 2025

PUC Docket Nos. IP7132 / GS-24-215

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Coneflower Energy, LLC (Coneflower Solar), a subsidiary of Apex Clean Energy Holdings, LLC (Apex), proposes to construct, own, and operate a 235 megawatt solar energy generating system and associated facilities in Lyon County, Minnesota. Coneflower Solar must obtain a site permit from the Minnesota Public Utilities Commission before it can construct the proposed Coneflower Solar Project.

Sources

Much of the information used to prepare this environmental assessment comes from Coneflower's site permit application. Additional sources include information from relevant federal and state environmental review documents for similar projects, spatial data and site visits. Unless otherwise noted, all URL addresses were current as of March 25, 2025.

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 (24-215), 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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CONTENTS

Appendices

Figures

TABLES

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Description
AADT	annual average daily traffic counts
AC	alternating current
AIMP	Agricultural Impact Mitigation Plan
ALJ	administrative law judge
ANSI	American National Standards Institute
applicant	Coneflower Solar
application	site permit application
AQI	Air Quality Index
BMP	best management practice
BWSR	Board of Water and Soil Resources
CBA	Community Benefit Agreement
CMMS	computerized maintenance management system
CO	carbon monoxide
Commerce	Department of Commerce
Commission	Public Utilities Commission
CR 7	County Road 7/240th Avenue
CR 63	County Road 63/230th Avenue
CR 67	County Road 67/250th Avenue
CSW PERMIT	Construction Stormwater Permit
CWA	Clean Water Act
dBA	A-weighted sound level recorded in units of decibels
DC	direct current
DEED	Department of Employment and Economic Development
DNR	Department of Natural Resources
DSP	draft site permit
DWSMA	Drinking Water Supply Management Area
EA	environmental assessment
EERA	Energy Environmental Review and Analysis Unit
EJ	environmental justice
EMF	electromagnetic fields
EPA	United States Environmental Protection Agency
EPC	engineering, procurement, and construction
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
HVTL	high voltage transmission line
IEEE	Institute of Electrical and Electronics Engineers
IPaC	Information for Planning and Consulting
IRA	Inflation Reduction Act
kV	Kilovolt
LCS	Lyon County Station
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture

MDH	Minnesota Department of Health
mG	milligauss
MIAC	Minnesota Indian Affairs Council
MISO	Midcontinent Independent System Operator
MNDLI	Minnesota Department of Labor and Industry
MnDOT	Minnesota Department of Transportation
MNEC	Minnesota Energy Connection
MPCA	Minnesota Pollution Control Agency
MW	megawatt
MWh	megawatt hour
MWI	Minnesota Well Index
NAC	noise area classification
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHIS	Natural Heritage Information System
NLEB	Northern Long Eared Bat
NO_2	nitrogen dioxide
NOX	nitrogen oxides
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
O&M	operations and maintenance
OAH	Office of Administrative Hearings
OSA	Office of the State Archeologist
OSHA	Occupational Safety and Health Administration
PBC	Prairie Bush Clover
PCO	point of change of ownership
PM	particulate matter
POI	point of interconnection
PLS	Pure Live Seed
Project	Coneflower Solar Project
PV	photovoltaic
PWI	Public Waters Inventory
RIM	Reinvest in Minnesota
ROI	region of influence
ROW	right-of-way
SCADA	supervisory control and data acquisition
SDS	State Disposal System
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SO_2	sulfur dioxide

SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWCD	Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
TCB	Tricolored Bat
TCLP	Toxicity Characteristic Leaching Procedure
TCS	Traditional Cultural Specialist
THPO	Tribal Historic Preservation Officer
US 14	United States Highway 14
US 59	United State Highway 59
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VMP	Vegetation Management Plan
VMU	Vegetation Management Unit
WCA	Wetland Conservation Act
WHP	Wellhead Protection Program
WHPA	Wellhead Protection Area
WIA	Walk-In Access Area
WMA	Wildlife Management Area
WPA	Waterfowl Production 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 2,299.4-acre area for which Coneflower Solar is assumed to have site control through ownership, a lease agreement, or an easement. The site permit application refers to this as the “Site” or “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 1,723.2-acre area within the land control area where Coneflower 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 "Project Footprint."

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.

utility-owned means owned by Xcel Energy

1 Introduction

Coneflower Energy, LLC (Coneflower Solar, applicant) is proposing to construct and operate the Coneflower Solar Project (project), a 235 megawatt (MW) solar farm in Lyon County, Minnesota. Coneflower 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 one of two potential scenarios. First, it could connect to the existing 115 kV Lyon County to Lake Yankton transmission line (the MISO Scenario) via a switching station and short (≤500 feet) 115 kV transmission line. Second, it could connect to the proposed Garvin Substation (the Garvin Scenario) via a short (≤1 mile) 345 kV transmission line. Because of the difference in transmission line lengths, the 115 kV MISO Scenario interconnection would not require a route permit; the 345 kV Garvin Scenario would require a route permit from the Commission. Should the Garvin Scenario be pursued, an additional environmental document discussing the interconnecting 345 kV transmission line would be prepared.

The MISO Scenario and Garvin Scenario are largely the same, however, there are some slight differences in project layout and facilities between the two. This results in slight differences in costs, tasks, and potential impacts between the two scenarios. Throughout this document, any details or impacts specific to the MISO Scenario will be indicated with a superscript letter "M" [M], while those specific to the Garvin Scenario will be indicated with a superscript letter "G" [G].

The applicant filed a site permit application (application) on August 19, 2024, and the Commission found the application to be substantially complete on October 15, 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**).

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

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

1.2 What does the applicant propose to construct?

Coneflower Solar proposes to construct a 235 megawatt solar energy generating system and associated facilities on a site of approximately 2,299.4 acres within Custer Township in Lyon County, Minnesota.

The project will consist of photovoltaic (PV) panels, trackers, inverters, transformers, approximately 15 miles of gravel access roads, security fencing, above-ground and below-ground electric collection lines, a project substation, a switching station,[M] an up to 1 mile 345 kV transmission line,[G], and associated facilities (Figure 1, Figure 2).

Coneflower Solar proposes to locate the solar facilities in blocks within the 2,299.4 acres of land under lease or owned by the applicant. Based on preliminary design, Coneflower Solar anticipates approximately 1,723.2 acres within the 2,299.4 acre land control area will be developed for the solar facilities. The solar facilities will be connected to the project substation via 34.5 kilovolt (kV) underground electric collection lines. The collection corridor is estimated to comprise approximately 9.7 acres of the project area. A short (≤500 feet), aboveground 115 kV transmission line will run from a utility-owned switching station immediately adjacent to the project substation to the existing 115 kV Lyon County to Lake Yankton transmission line,[M] or a short (≤1 mile), aboveground 345 kV transmission line will run from the project substation to the proposed Garvin Substation.[G]

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

[2] SPA, p. 7, Table 2.4-1: Project Schedule.

Figure 1. Proposed Coneflower Solar Project – MISO Scenario

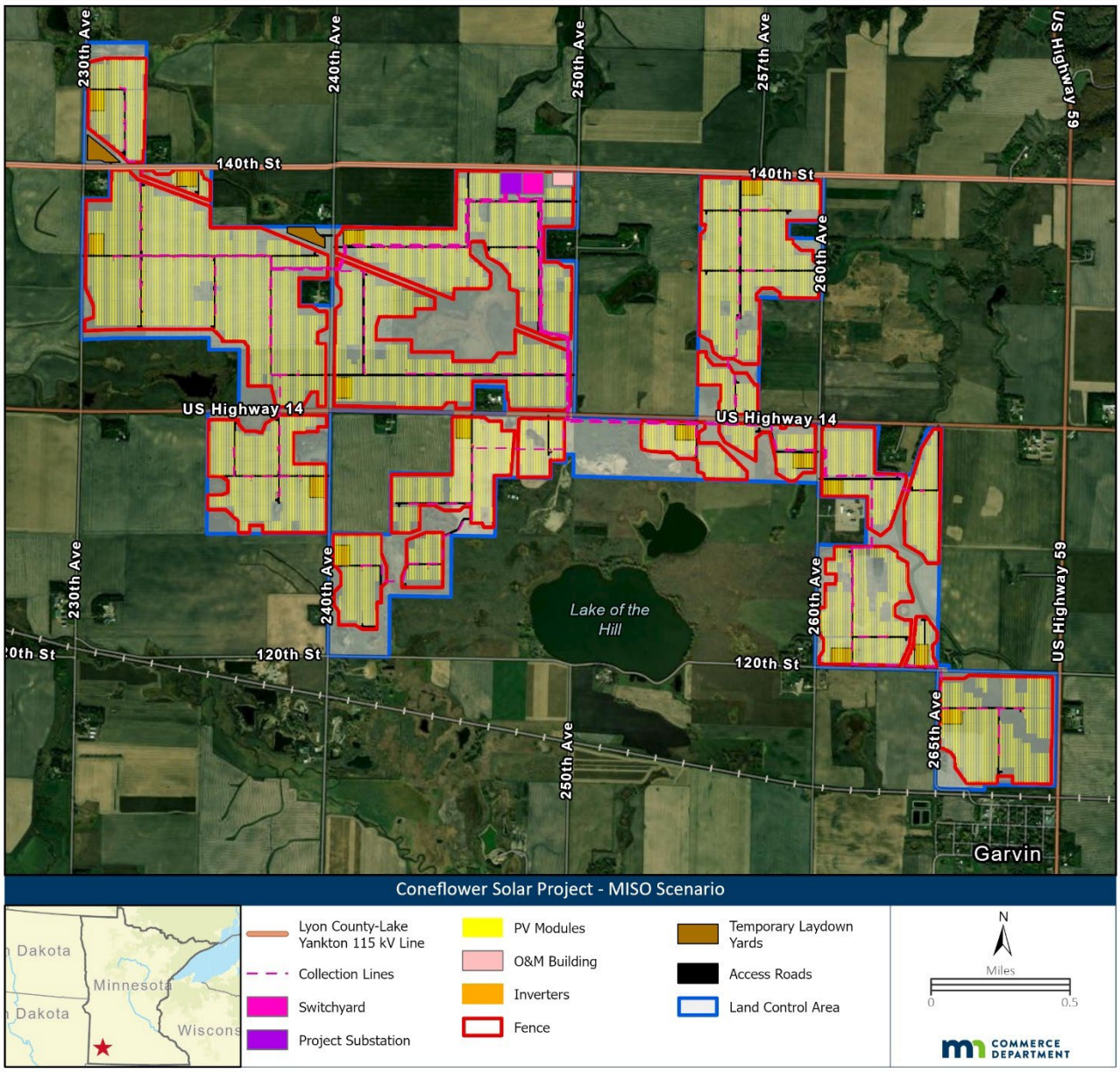
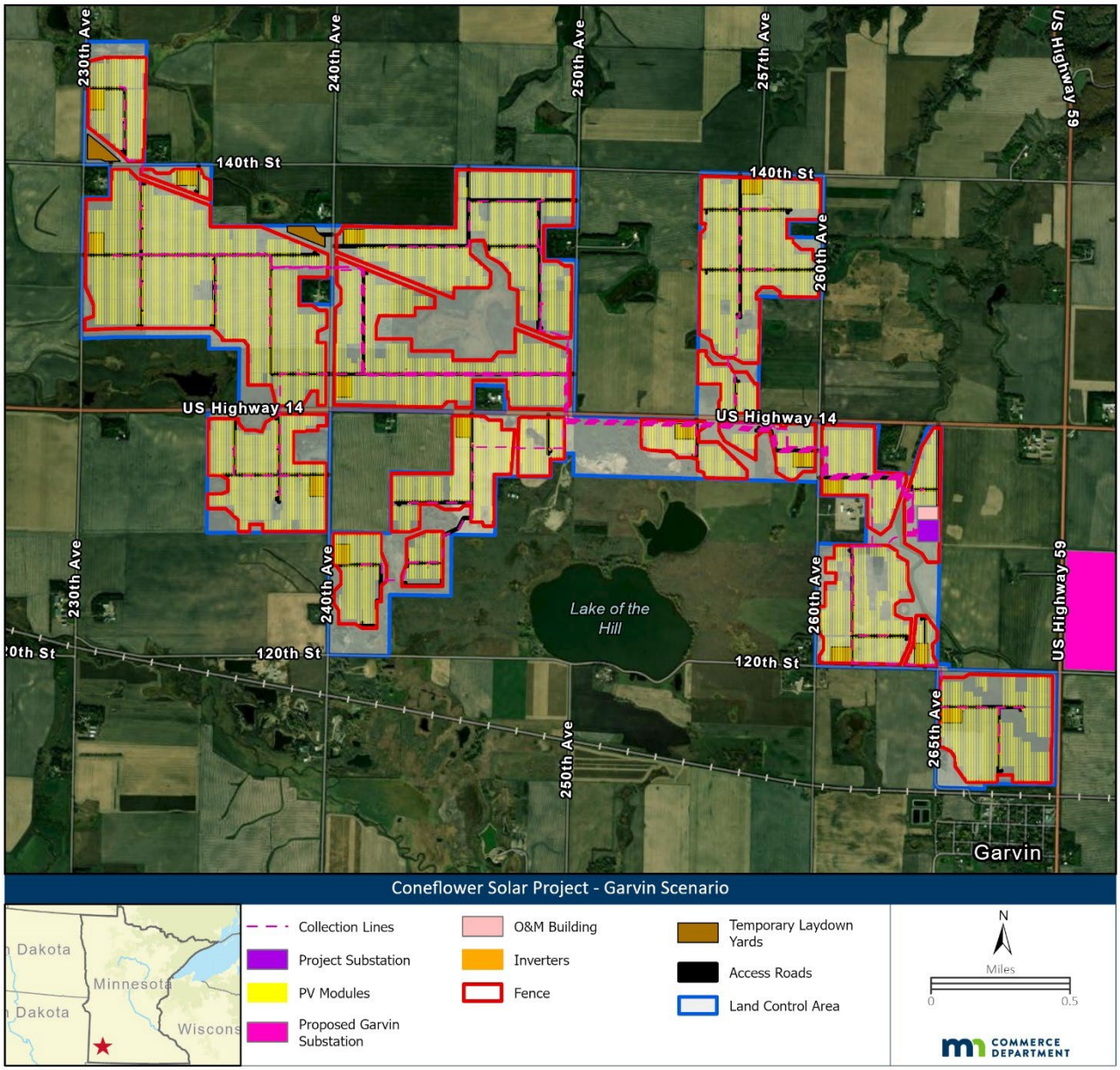


Figure 2. Proposed Coneflower Solar Project – Garvin Scenario



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

Coneflower Solar applied to the Commission for a site permit for the project on August 19, 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?

[3] Minnesota Statute 216E.10, subd. 1.
[4] Minnesota Statute 216E.03, subd. 7.
[5] Coneflower Solar Project, Application to the Minnesota Public Utilities Commission for a Site Permit for a Large Electric Generating Facility, August 19th, 2024, eDockets Numbers 20248-209609-01 (through -10), 20248-209610-01 (through -08).
[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.

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.

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: Lauren Agnew (lauren.agnew@state.mn.us), (651) 539-1838 or the Commission Staff: Scott Ek (scott.ek@state.mn.us) (651) 539-1070.

Information about the project, including the site permit application, notices, and public comments, can be found on eDockets: https://efiling.web.commerce.state.mn.us/documents by searching Docket #s "24-215". Information is also available on Commerce's webpage for the project: https://apps.commerce.state.mn.us/web/project/15699.

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: human settlement, human health and safety, land-based economies, archeological and historic resources, and natural resources.

Select resource topics received abbreviated study because potential impacts to these resources are anticipated to be negligible. These resource topics include: displacement, communications, implantable medical devices, forestry, and topography.

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 to moderate and long-term. 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 are difficult to address. The cumulative impacts of several future energy projects in close proximity to the solar facility may augment the perceived impacts to cultural values.

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

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 moderate. Most impacts will be short-term and related to construction. Impacts to the viewshed of recreational resources and the loss of a Walk-In-Access hunting site are long-term impacts of the project.

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.

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 to workers. 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. Additional public risks include construction-related impacts reducing motorist safety on state highways. Potential impacts during construction are anticipated to be minimal. Potential impacts during operation 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 Lyon 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.

Mining Impacts to mining operations are not anticipated. There may be potential for impacts resulting from increased traffic during construction, however impacts will be temporary.

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 are not anticipated. Potential impacts to groundwater resources, should they occur, would be intermittent and minimal, but have the potential to occur over the long-term. 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 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. Because the soil at the solar facility will be covered with perennial vegetation for the life of the project, soil health is likely to improve. The extent of positive and negative impacts is dependent upon the abundance of native perennial vegetation within the project.

Surface Water The impact intensity level is anticipated to be minimal to moderate. Direct impacts to surface waters are not expected. Indirect impacts to surface waters may occur. These impacts will be short- and long-term and could extend to the Des Moines and Cottonwood Rivers. Impacts can be mitigated.

Wetlands The impact intensity level is anticipated to be minimal to moderate. Direct impacts are not expected. There is a potential for wetlands to be indirectly affected. These impacts will be short- or long-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 are anticipated to be minimal to moderate and can be mitigated through development of a VMP.

Wildlife and Habitat Potential impacts may be positive or negative and are species dependent. Long-term, positive impacts to small mammals, insects, snakes, etc. would occur; impact intensity would depend on the amount and quality of habitat created by the project. 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 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 to moderate.

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 (GHG) 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]

A draft site permit (DSP) for the project is included in **Appendix B**.

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.

Factor M (unavoidable impacts) and **Factor N** (irreversible and irretrievable resource commitments) are discussed in Section 4.9 and Section 4.10, 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
O	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	O	O
Displacement	●	●

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

Cultural Values	○	○
Electric Interference	●	●
Environmental Justice	●	●
Floodplains	●	●
Land Use and Zoning	○	○
Noise	⊘	●
Property Values	○	○
Recreation	○	○
Socioeconomics	●	●

Factor A: Public Services

Element	**Construction**	**Operation**
Airports	●	●
Roads	○	●
Utilities	●	●

Factor B: Public Safety

Element	**Construction**	**Operation**
EMF	●	●
Emergency Services	●	●
Medical Devices	●	●
Public Safety	●	●
Stray Voltage	●	●
Worker Safety	●	●

Factor C: Land-based Economies

Element	**Construction**	**Operation**
Agriculture	○	○
Forestry	●	●
Mining	●	●
Tourism	●	●

Factor D: Archaeological and Historic Resources

Element	**Construction**	**Operation**
Archeological	●	●
Historic	●	●

Factor E: Natural Resources

Element	**Construction**	**Operation**
Air Quality	●	●
Climate Change	●	●
Geology and Groundwater	○	●

Soils	○	○
Surface Water	●	○
Topography	●	●
Vegetation	●	○
Wetlands	●	○
Wildlife	○	○
Wildlife Habitat	●	●
Factor F: Rare and Unique Resources		
Element	**Construction**	**Operation**
Fauna	●	●
Flora	●	●
Factor I: 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 18), 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 are difficult to address. Cumulative impacts from multiple energy projects in the area will amplify perceived impacts to cultural values.

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.

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 B: PUBLIC SAFETY

Public Safety Potential impacts to motorist safety associated with construction are anticipated to be short-term and localized. The impact intensity is expected to be minimal. Impacts can be mitigated by alteration of project entry points, installation of permanent road features to reduce collision risk, and modifying design to reduce snow drift buildup. During operation, no impacts to motorist safety 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 to moderate—lost farming revenues will be offset by easement agreements. A negligible loss of farmland in Lyon County would occur for the life of the project. Nearly all of the solar facility is located on land classified as prime farmland or prime farmland if drained. The project will impact approximately 1,675[M] to 1,723[G] acres of 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.

FACTOR E: NATURAL RESOURCES

Geology and Groundwater Impacts to geology 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 perennial vegetation for the life of the project, soil health is likely to improve. The extent of positive and negative impacts is dependent upon the abundance of native perennial vegetation within the project.

Surface Water Impacts to surface waters are anticipated to be minimal to moderate. Drainage systems within the land control area extend the impact range to adjacent waterways. Impacts can be mitigated through the use of BMPs for stormwater management and utilizing erosion control materials appropriate for aquatic systems.

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.) and aquatic wildlife in connected waterways.

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 second half of 2025.

2 Proposed Project

Coneflower Solar proposes to construct and operate an up to 235 MW solar farm within Custer Township in Lyon County, Minnesota. The developed portion of the project will occupy approximately 1,723 acres of the 2,299 acres under lease or easement agreements. The project will interconnect to the electrical grid through a short (≤500 feet) 115 kV transmission line to the existing 115 kV Lyon County to Lake Yankton transmission line,[M] or through a short (≤1 mile) 345 kV transmission line to the proposed Garvin Substation.[G] This chapter describes the project and how it would be constructed, operated, and decommissioned.

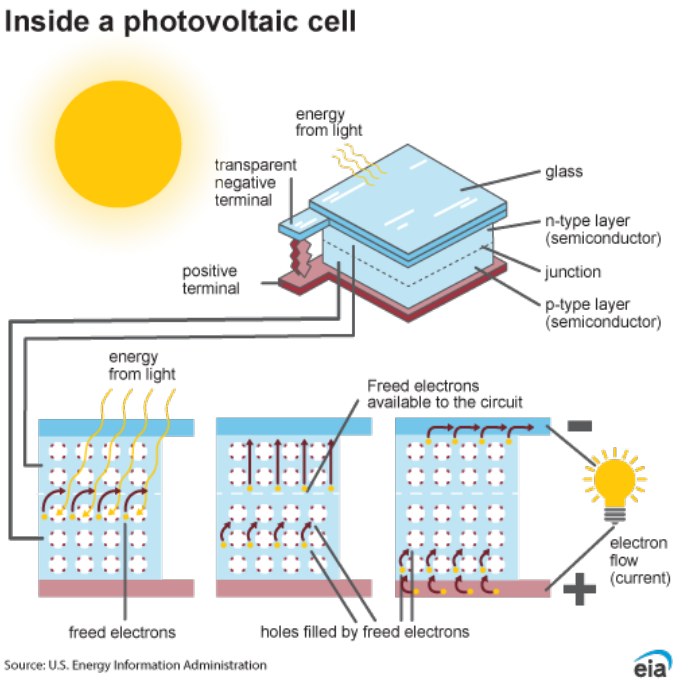
2.1 Solar Facility

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 solar radiation (sunlight) strikes a photovoltaic (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 current as depicted in Figure 3.[9]

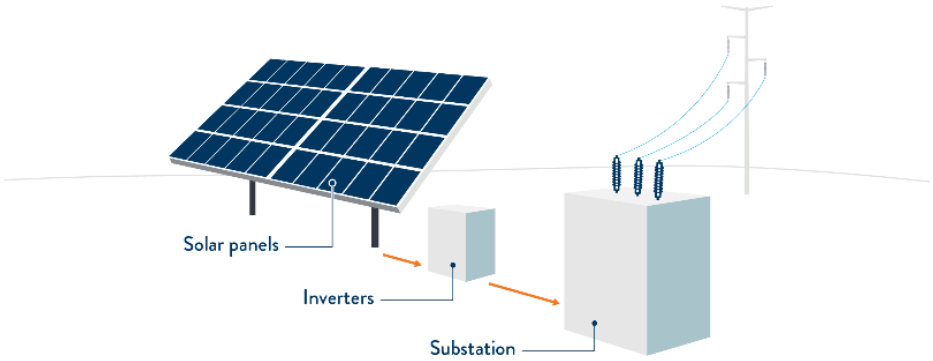
Figure 3. Photovoltaic Cell



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 4 shows a simplified schematic of the major components of the solar generating facility.

[9] U.S, Energy Information Administration (May 26, 2023) *Solar Explained: Photovoltaics and Electricity*. https://www.eia.gov/energyexplained/solar/photovoltaics-and-electricity.php

Figure 4. Solar Facility Schematic



2.1.2 Where is the Project located?

The Project is located within Custer Township in Lyon County, Minnesota.

The proposed solar facility is located within Custer Township in Lyon County. Table 2 summarizes the project location by township, range, and section. The solar facility would be located on approximately 1,723 acres within an area of approximately 2,299 acres of land owned or leased by the applicant. Approximately 95% of the site is currently used as cultivated farmland or hay/pastureland, with the remaining 5% consisting of minimal tree and grassland cover, wetlands/open water, farmsteads, and township and county roads.

Coneflower Solar selected the project site based on grid access and existing transmission infrastructure, sufficient solar resource, landowner participation, and ease of development.[10]

Table 2. Project Location

Township	Range	Sections	Township	County
109N	41W	7, 16-22, 27	Custer	Lyon

2.1.3 How is the solar facility designed?

The project will consist of will consist of PV panels, trackers, inverters, transformers, access roads, security fencing and gates, below- and above-ground electric collection and communication lines, a project substation and interconnection facilities, metering equipment, step-up transformers,

[10] SPA, pp. 11-12.

supervisory control and data acquisition (SCADA) system, an operation and maintenance (O&M) building (if located on site), up to five permanent weather stations, a stormwater management system, temporary and permanent laydown yards, a switching station,[M] a short aboveground 115 kV transmission line,[M] and a short aboveground 345 kV transmission line.[G] The project design and layout between the MISO and Garvin Scenarios are largely similar, with minor differences in the location (Figure 1, Figure 2) and acreage (Table 3) of project facilities due to differing interconnection requirements.

Table 3. Estimated Project Facility Acreages

Project Facilities	Acres	
	MISO Scenario	Garvin Scenario
Solar panels (within fence)	1,606.3	1,611.0
Inverters	0.6	0.6
Project Substation	5.1	5.1
Switching Station[M]	5.1	--
O&M Building	3.0	3.0
Laydown Areas (within fence)	50.5	50.5
Laydown Areas (outside fence)	9.4	9.4
Access Roads	25.2	25.6
Stormwater Basins	18.0	18.0
Total	**1,723.2**	**1,723.2**

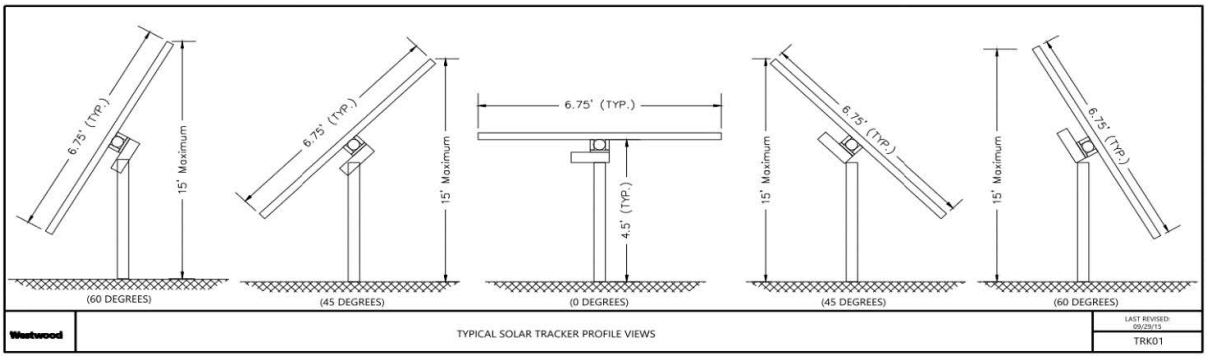
2.1.3.1 SOLAR ARRAYS

Although design and equipment specifications have not been finalized, Coneflower Solar's current design anticipates using PV panels with tempered coated dual glass, a tilt angle range of up to 60 degrees, and approximately 18 inches of ground clearance. Individual panels will be approximately four feet long by eight feet wide by one to and two inches thick. Depending on the final technology selected, panels may have either an aluminum frame, silicon, and weatherized plastic backing, or a side-mount or under-mount aluminum frame, heat strengthened front glass, and laminate material encapsulation.

Figure 5. Typical Solar Array

The panels will be affixed to single-axis, horizontal, linear tracker racking systems supported by vertical steel piles driven into the ground, with roughly 15 feet between trackers when panels are in the horizontal position. Arrays are anticipated to be arranged in approximately 810 north-south oriented rows,[11] allowing the panels to track the sun from east to west (Figure 5). Small motors on the racking system rotate the panels on a single point 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 (Figure 6). This tracking of the sun maximizes the project's electrical production. When level to the ground, solar panels will be 5-8 feet above the ground,[12] and when tilted to their highest position (early and late in the day), the top edge of the solar panels will be up to 12 feet above the ground. The project will require approximately 547,560 PV panels to establish the up to 235 MW AC capacity mounted on an estimated 7,250 single axis trackers.[13,14,15]

Figure 6. Typical Solar Tracking Profile



[11] EA, Appendix C, Question 5.
[12] Id.
[13] SPA, pp. 17 – 18.
[14] SPA, Appendix F: Decommissioning Plan.
[15] EA, Appendix C, Question 5.

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 60 inverters through cables mounted underneath the panels in a hanging harness system (Figure 7[16]), with some segments buried below-ground. The use of a hanging harness system minimizes soil disturbance and trenching along every row of panels.

Figure 7. DC Cabling Hanging Harness System

The inverters convert approximately 1,500 volts of DC output to about 4,400 kilovolt-amperes per kilowatt (kVA/kW) (depending upon inverter specifications) alternating current (AC). Then, the transformer steps up the power to 34.5 kV for transmission through an underground collector system to the project substation. Power inverters and transformers will be housed on inverter "skids" on top of concrete slab or steel pile foundations. Foundations typically measure 15 feet wide by 20 feet long. The height of a skid is anticipated to be approximately 12 feet above grade.

Figure 8. Inverter

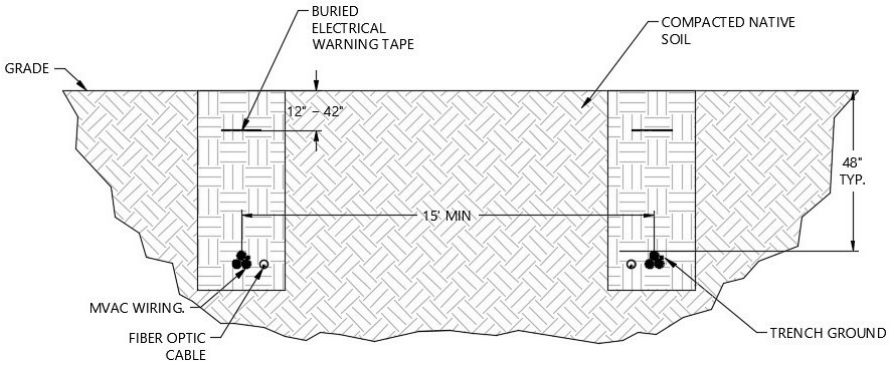
The project has been designed using the Sungrow Power Supply Co. SG4400UD-MW-US inverters, which are approximately 20 feet long, 10 feet long, and 8 feet tall.[17] From a distance, inverters skids will look like one-half of a semi-trailer box (Figure 8[18]). The final number of inverters, currently anticipated to be 60, will depend on the inverters selected for the project as well as the final solar panel configuration. The use of

[16] SPA, p. 18, Image 2: Hanging Harness System for DC Cabling between Panels and Inverters
[17] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[18] SPA, p. 19, Image 3: Representative Photo of an Inverter.

concrete slabs or steel piles for inverter skids will be determined closer to construction. If used, concrete pads will be poured onsite or precast and assembled off-site.

Electrical energy (34.5 kV AC) will be transmitted from inverter skids to the project substation through underground cables (Figure 9). Cabling will be trenched or plowed into place to a dept of at least four feet below grade. Trenches will be backfilled with removed subsoil followed by stockpiled topsoil to return the surface to its finished grade. Coneflower Solar estimates that approximately 27.6[M] miles or 35.0[G] miles of below-ground electrical collection lines will be installed throughout the project to connect all inverters to the project substation.[19,20]

Figure 9. Underground Cabling



2.1.3.3 FENCING

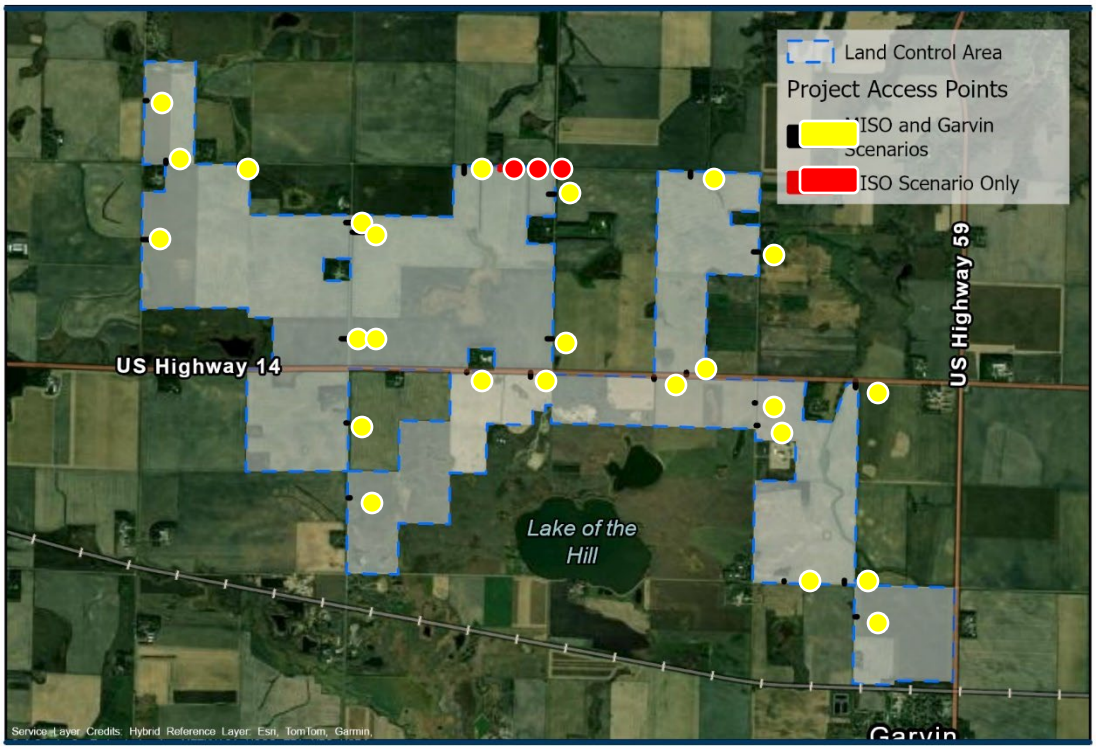
All solar arrays will be fenced for security and to prevent public and larger wildlife access. Permanent security fencing will be secured to posts along the perimeter of the solar arrays and preliminary development area. Arrays will be fenced in groupings and will not impact public access to any roads running through the land control area. Fence posts along the fence line are anticipated to be directly embedded into the soil or set in concrete foundations if required for structural integrity and based on soil conditions. The perimeter fencing around the project will be 7 feet tall woven wire topped with 1-foot of three to four strands of smooth wire.[21,22] The perimeter fence will have locked gates at either 25[G] or 28[M] access points (Table 4, Figure 10). The majority of project access points are the same between the two design scenarios, save for three separate entrances for the substation, switchyard and O&M building in the MISO Scenario. In the Garvin Scenario, the substation and O&M building can be accessed via an entrance to a solar panel area; no separate entrances are needed.[23]

[19] SPA, p. 18.
[20] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[21] SPA, p. 20.
[22] SPA, Appendix A: Figures, Part 1 of 3, Figure 3a[M] and 3b[G]: Preliminary Project Layout.
[23] SPA, p. 20.

Table 4. Project Access Points

Road	Temporary Access Points	
	MISO Scenario	Garvin Scenario
120th Street	1	1
140th Street	1	1
Total Temporary Access Points	**2**	**2**
Road	**Permanent Access Points**	
	MISO Scenario	**Garvin Scenario**
120th Street	1	1
140th Street	6	3
260th Avenue	3	3
265th Avenue	1	1
CR 7	6	6
CR 63	2	2
CR 67	2	2
US 14	5	5
Total Permanent Access Points	**26**	**23**

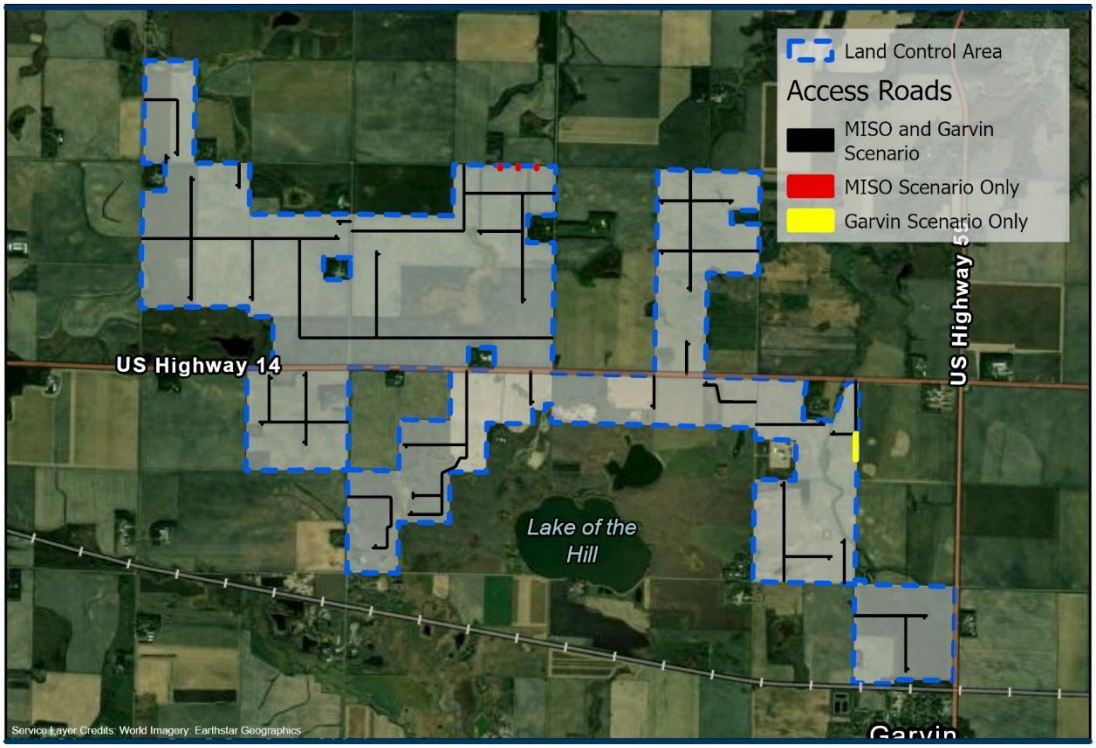
Figure 10. Project Access Points



2.1.3.4 Access Roads

Although the total length of access roads will depend upon the equipment selection and the design scenario used, the preliminary layout anticipates approximately 15 miles of internal graveled access roads. Access road layout is largely the same between the two design scenarios; the minor differences in the northcentral[M] and southeastern[G] sections of the site are for accessing the specific locations of the switchyard,[M] project substation,[M,G] and O&M building[M,G] in each scenario (Figure 11). These roads will be used for operations and maintenance activities. Roads will be approximately 20 feet wide along straight portions and wider along curves, internal intersections, and turn arounds (approximately 35-foot internal turning radius). Road width at site entrances will be 35 feet. Roads will be at grade and will not have shoulders.[24]

Figure 11. Project Access Roads



2.1.3.5 Project Substation

The project substation is proposed to be located in the northcentral portion of the project,[M] adjacent to the existing Lyon County to Lake Yankton 115 kV line, or in the southeastern portion of the project,[G]

[24] EA, Appendix C, Question 6.

near the proposed Garvin Substation (Figure 12). In both scenarios, the substation will be located inside the project fence on gravel and is estimated to occupy approximately 5 acres of agricultural land, with a final footprint of 2-3 acres after construction. The project substation will include either a 34.5/115 kV[M] or 34.5/345 kV[G] step-up substation with metering equipment required for interconnection to the transmission grid. Other components of the substation include supporting structures for high voltage electrical structures, breakers, transformers, lightning protection, and control equipment. Underground 34.5 kV collector lines from the inverters will deliver energy to the project substation. A plan view of a step-up substation conceptually similar to the substation required for both the MISO Scenario and the Garvin Scenario can be found in **Appendix D** (Figure A[25]).

In the MISO Scenario, the collector system voltage will be stepped up from 34.5 kV to 115 kV at the substation and transmitted to the existing Lyon County to Lake Yankton 115 kV transmission line via an adjacent, utility-owned switchyard and short (≤500 feet) overhead 115 kV gen-tie line. A plan view of a typical switchyard can be found in **Appendix D** (Figure B[26]).

In the Garvin Scenario, the collector system voltage will be stepped up from 34.5 kV to 345 kV at the substation and transmitted to the proposed Garvin Substation via a short (≤1mile), overhead 345 kV gen-tie line constructed with steel monopole structures at a maximum anticipated height of 165 feet.[27] The overhead 345 kV gen-tie line is not visualized in Figure 12. The final location of this line, should the Garvin Scenario be selected, will be determined during the Route Permit Application proceedings required for this scenario.

The final layout of the project interconnection facilities, gen-tie line, and interconnecting utility-owned switchyard is dependent upon the design scenario that Coneflower selects. The project substation will be designed in compliance with the National Electrical Safety Code (NESC) and other applicable practices, standards, and codes.[28]

[25] EA, Appendix C, Question 2.
[26] Id.
[27] EA, Appendix C, Question 7.
[28] SPA, p. 19.

Figure 12. Proposed Substation and Interconnection Facilities

FENCING

The fenced area of the project substation is expected to be a 6 ft high chain link security fence topped with a 1-foot-tall, barbed wire strand in compliance with electrical codes and the NESC. A lockable gate will be installed with the project substation fencing, and the final design of the fence will prevent the public and wildlife from gaining access to the facility.[29]

2.1.3.6 OPERATIONS AND MAINTENANCE BUILDING

An O&M building will be used to conduct maintenance and repair of project equipment and components, store parts, tools, and equipment, store various O&M supplies, and will house the SCADA system used to remotely monitor project facilities. The O&M building will contain an office for the on-site Project Plant Manager, a technician room, a restroom, and a storage area/maintenance shop. Coneflower Solar will locate the O&M building, along with a rock base parking lot of approximately 3,000 ft^2, adjacent to the project substation in both scenarios. The total area for the O&M building and adjacent parking lot is estimated to be 3 acres. An on-site well and septic system will provide water and sanitation services for employees using the building. O&M buildings are typically made of steel and have dimensions of 1,00-1,500 ft^2.[30] The O&M building will be fenced by a 6-foot tall chain-link fenced topped with one foot of barbed wire in compliance with applicable electrical codes. A locked gate will provide access to the O&M building.[31]

2.1.3.7 WEATHER STATIONS

Coneflower Solar plans to install up to 5 permanent weather stations throughout the site to gather weather data such as wind speed and direction, ambient temperature, solar irradiance, etc. during the operation of the project. The final locations of the weather stations will be determined following final engineering. Weather stations will be steel structures anchored to a foundation with mounted sensors and instrumentation. The weather stations will be connected to the AC collection system and contain solar powered batteries as backup power sources. Weather stations will extend to a height of approximately 10 feet above ground level (Figure 13[32]).[33]

Figure 13. Typical Solar Weather Station

[29] SPA, p. 19.
[30] SPA, pp. 20-21.
[31] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[32] EA, Appendix C, Question 8.
[33] SPA, p. 21.

2.1.4 How would the solar facility be constructed?

Coneflower Solar anticipates that construction of the solar facility will begin in 2026 with an in-service date of 2027. This section summarizes construction activities. Unless otherwise noted, this summary has been adapted from Section 4.4.1 and Appendix D, the *Agricultural Impact Mitigation Plan* (AIMP), of the site permit application.

Coneflower Solar anticipates that construction will begin in the second quarter of 2026 to meet an in-service goal of 2030.[34] The actual construction schedule is dependent upon permitting, final design, delivery of equipment, and workforce availability. Coneflower Solar has provided an anticipated construction activity schedule that includes approximate durations (Table 5), noting that construction will be sequenced (i.e. construction activities will occur simultaneously in different sections of the preliminary development area). Ultimately, construction is anticipated to take approximately 18 months, likely over two construction seasons.[35]

Table 5. Construction Phase Timelines

Phase	Length
Site Clearing	1 month
Earthwork	3 months
Access Road Construction	3 months
Solar Array Construction	12 months
Electrical Collection System Construction	9 months
Substation Construction	9 months

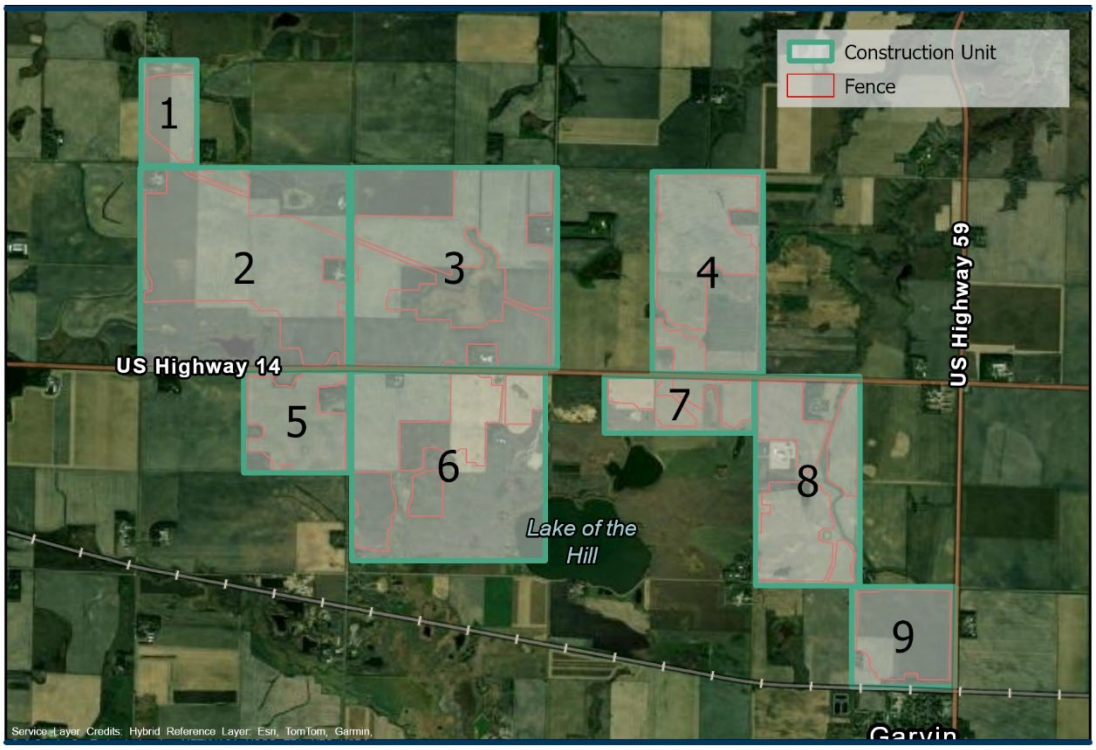
Construction will begin after all necessary permits and approvals have been received including a large generator interconnection agreement from MISO[M,G] and a surplus interconnection system agreement with Xcel Energy.[G] The project consists of 9 total construction units – sections of PV panels grouped by their connectivity and location in relation to surrounding roads (Figure 14) that range in size from 91 to 647 acres (Table 6).

Table 6. Construction Unit Acreage

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
Acreage	91	647	637	345	166	564	130	336	160

[34] SPA, p. 7.
[35] EA, Appendix C, Question 9.

Figure 14. Project Construction Units



Project construction will begin with workforce and equipment mobilization and initial site preparation activities including construction entrance stabilization, surveying and marking of project facilities, installation of necessary security fencing, and grading. Coneflower Solar anticipates that some grading will be required to provide a level surface for the solar arrays and maintain soil stability, but it will be minimized as the project is located on relatively flat agricultural land.[36] Dependent upon when construction begins, initial construction activities may include the clearing of row-crop remnants from the 2025 harvest or the planting of a cover crop in the spring of 2026.

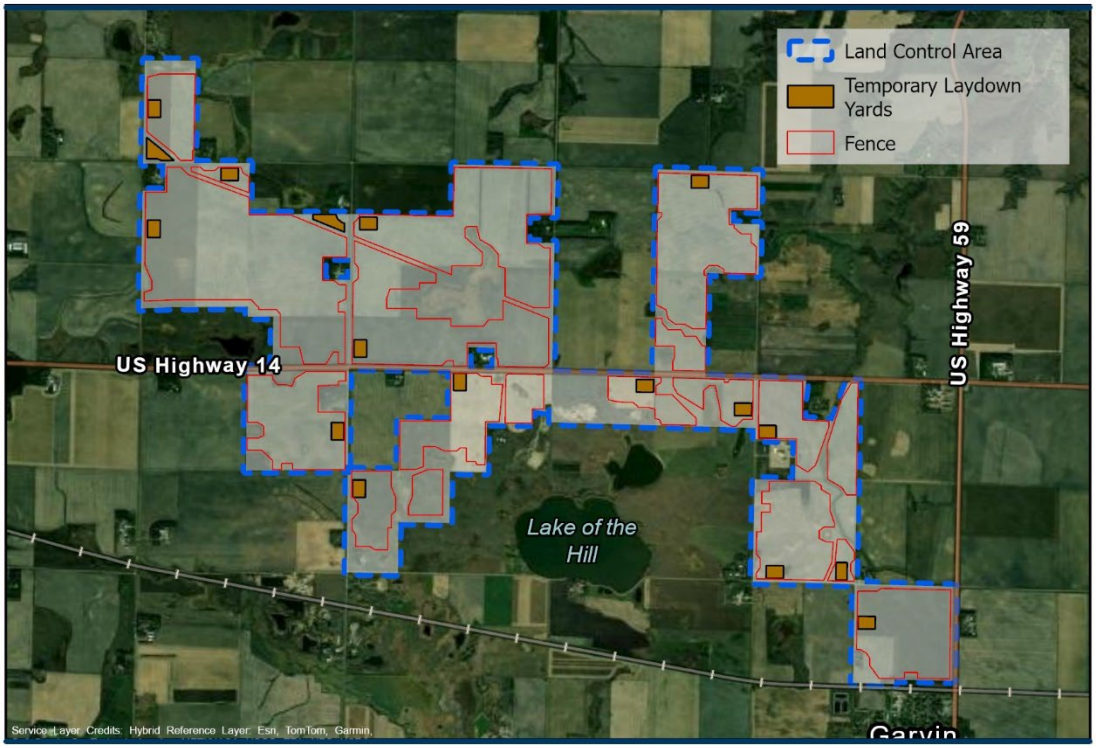
Coneflower Solar anticipates installing approximately seventeen temporary laydown yards on 59.05 acres of the project area (Figure 15). These areas will be used as parking areas for construction workers and staging areas for project components (e.g., modules, racking) during the construction phase. Additionally, the laydown yards will contain debris/trash collection points and dumpsters for construction waste. The location and size of all seventeen temporary laydown yards is the same between the MISO Scenario and the Garvin Scenario.

[36] SPA, pp. 89-90.

Two of the temporary laydown yards, approximately 9.4 acres, will be located outside of the fenced preliminary development area in the northwestern portion of the project. These two yards will be graveled during the construction phase, after which they will be restored to either pre-construction conditions (agricultural use) or with a native seed mix. The two laydown yards outside of the preliminary development area will not be fenced.[37]

The remaining 15 temporary laydown yards, approximately 50.5 acres, will be located inside the fenced preliminary development area. The laydown yards within the fence blocks will stage components for that block. These yards will not be graveled during the construction phase, rather they will be graded and/or matted with wood mats as needed.[38] Following construction, the within-fence laydown yards will be stabilized with sediment stabilization and erosion control measures and restored according to the VMP. All 17 temporary laydown yards have been sited to avoid tree clearing.[39] The permanent parking lot adjacent to the O&M building will also be used as a laydown yard during project construction.[40]

Figure 15. Temporary Laydown Yards



[37] EA, Appendix C, Question 10.
[38] Id.
[39] SPA, p. 21.
[40] EA, Appendix C, Question 10.

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

The majority of traffic volume during construction will consist of delivery trucks and/or passenger vehicles. Semi-truck equipment delivery will vary based on the timing of construction and equipment delivery. Truck traffic will be lower prior to the peak of construction, beginning during access road construction as cables and associated materials and the substation equipment are brought to the site at rates of 1 to 3 truck deliveries per week. Truck traffic will pick up as access road construction is finalized and pile are brought to the site at a rate of 3 truck deliveries per day. A period of high semi-truck traffic volume, estimated at a rate of 15 to 20 truck deliveries per day, will then last for several months during peak construction as the piles, racking, panels, and inverters are delivered and installed on site. Truck traffic will decrease once these components have been delivered. Coneflower Solar notes that truck deliveries will be dispersed throughout the project, as installation will be completed in a phased approach and spread out throughout the site.[41] Approximately 200 construction workers will be used during peak construction, with 150-200 employee vehicles used for daily travel to/from the project.[42]

Coneflower Solar anticipates that the project will generate approximately 300 temporary jobs during the construction and installation phases, and 3 permanent full-time jobs during the project operation phase. On site construction staff levels will depend upon the phase of the project and the number of concurrent tasks occurring. Generally, there will be fewer construction workers on site in the early stages of the pre-construction activities, approximately several dozen. During construction and phased installation of project components, there will be approximately 200 workers on-site at any one time, with numbers rising to 300 workers at peak construction. Once project components have been installed and the project enters the commissioning and restoration phases, onsite worker numbers will decrease to levels like the pre-construction stage.[43]

Following initial site preparation, the access roads, trackers, modules, inverters, collection system, communication lines, gen-tie line, and project substation will be constructed. When feasible, construction tasks will be performed concurrently.

Access Roads

Construction of permanent site entrances and access roads will start with stripping and segregating topsoil from the roadbeds to a depth of at least 12 inches. Topsoil will be windrowed to the edges of the roadbed by pushing materials into stockpiles, loose compaction, and/or "tracking" with stormwater and wind erosion best management practices (BMPs). The sub-grade materials, typically

[41] EA, Appendix C, Question 9.
[42] SPA, p. 60.
[43] EA, Appendix C, Question 11.

20-feet wide, will then be compacted to the specified requirements. After the sub-grade materials are suitably compacted, the road will be installed as designed. Depending on the soil type, geo-fabric may or may not be installed, followed by a road surface of 4-12 inches of gravel. The gravel will be installed level to the existing grade to help facilitate drainage and minimize ponding. After the access road gravel has been installed and compacted to the engineers' requirements, the project drainage ditches will be shaped according to the final grading plan. The previously stripped and windrowed topsoil will then be re-spread within the site.[44]

Solar Arrays

Solar array foundations will be installed after road construction. Arrays will be constructed in blocks, with the potential for multiple blocks to be constructed simultaneously. Foundations are typically galvanized steel piles drive into the ground up to 10 feet below the surface by hydraulic ram pile-driver. In areas where soils are low strength or loose and sandy, helical screw or auger-type foundation posts may be used instead. Foundation installation will minimize travel through each area, with the pile driver disturbing soil at each pile insertion location and while driving between insertion locations.[45] The pile driver is driven along tracks by two workers; the tracks disperse weight over a greater area to reduce soil disturbance.[46]

After foundations have been installed, racking installation will begin. Racking components will be distributed across the array using all-terrain tracked equipment, with crews installing array racking on top of the foundation piling by hand. After the racking is installed, PV modules will be installed by multiple crews using hand tools. Panels will be staged in advance throughout the blocks and brought to the specific work area by wagon-type trailers pulled by small tractors or all-terrain tracked equipment. Installation will proceed in a serpentine pattern along a pre-established route to minimize off-road traffic.[47]

Project Substation

Substation construction will partially overlap solar array construction. Construction in the substation area will begin with site preparation. Topsoil will be scraped, segregated, and placed in a designated storage location. The stripped topsoil will be pushed outside of the substation area and graded to facilitate long term preservation and revegetation. Subsoil will be removed and re-used as needed or moved to an acceptable pre-established and approved location for storage. Following site preparation, substructures, foundations, equipment embedments, and electrical equipment will be installed.

Coneflower Solar is considering two methods for the installation of substation foundations. Option 1 uses a small rubber tire backhoe to dig out the foundations prior to pouring the concrete slabs, while

[44] SPA, Appendix D: Agricultural Impact Mitigation Plan
[45] SPA, p. 26.
[46] SPA, Appendix D: Agricultural Impact Mitigation Plan
[47] SPA, pp. 26-27.

Option 2 uses an auger or drill-type machine for minor foundations. Both methods limit the amount of disturbance to the footprint of the substation for the foundation equipment and concrete trucks. Both above- and below-ground conduits will run from substation equipment to a control enclosure housing the protection, control, and automation relay panels. A station service transformer will be installed to meet primary AC power requirements, and batteries and chargers will be installed within the enclosure for auxiliary power to the control system. Following installation of the substation foundation and related components, the sub-grade materials will be compacted and the spoils around the substation yard will be re-graded. Final construction activities for the project substation will include installing the perimeter fence, installing adequate lighting around the substation site for worker safety, and placing crushed rock between and among installed equipment throughout the interior of the fenced area and 3ft outside the fence. When construction advances, the topsoil piles will be redistributed in a thin layer adjacent to the substation area and the topsoil will be revegetated with an appropriate seed mix.[48]

Utility-Owned Switchyard[M]

Xcel Energy would be responsible for the design, construction, and operation of the switchyard included in the MISO Scenario. Switchyard construction would occur concurrently with other project-related construction activities.

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 AC-DC inverter, medium-voltage transformer, and power control electronics) will be installed on concrete pad or steel pile foundations. If concrete pad foundations are used, the concrete will either be mixed on-site or pads will be pre-made to project specifications off site and delivered.[49] Prior to installing inverters, the topsoil on the installation site will be stripped and stockpiled at a designated storage location. The inverter foundations will be excavated using an excavator and rebar and concrete will be installed. Following concrete curing and strength testing, the subgrade soils around the inverters will be compacted. Once the concrete is set, the adjacent topsoil will be respread around the inverter. The inverter units will be placed on foundations of either frost-footing supported concrete pads or driven/helical screw pier foundations. The premanufactured skids containing the inverter, step-up transformer, and SCADA equipment will be delivered to each foundation by a truck with a flatbed trailer. Skids are typically set in place upon foundations using a rough-terrain type hydraulic crane.[50]

Electrical Collection System

[48] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[49] SPA, p. 19.
[50] SPA, Appendix D: Agricultural Impact Mitigation Plan.

Coneflower Solar anticipates using both above- and belowground 34.5 kV collection systems. The DC collection cables will be strung under each row of panels or suspended using a hanging harness system within the arrays, terminating at the inverters. The AC electrical collection system and associated communication lines will be installed below-ground for the AC electrical collection system. Cabling that runs from the inverters to the substation will be installed in trenches to a depth of at least 4 feet. Cabling will be done in accordance with the agricultural impact mitigation plan (AIMP) and multiple installation methods (e.g., trenching, plow method) may be used. The installation method will be determined based on site-specific conditions and will be consistent with general solar construction practices. Prior to trenching, a small backhoe will strip the upper 12 inches of topsoil and subgrade materials for temporary stockpiling in a designated location. The bottom of each trench may be lined with clean fill to surround the cables. Once cables have been installed on top of the fill or bedding materials, the trench will be backfilled with native backfill subsoil followed by stockpiled topsoil to restore the trench to the original grade. Part of the belowground AC collection system will be horizontally directionally drilled under CR 7, 260th Avenue, US 14, 120th Street, and 140th Street.

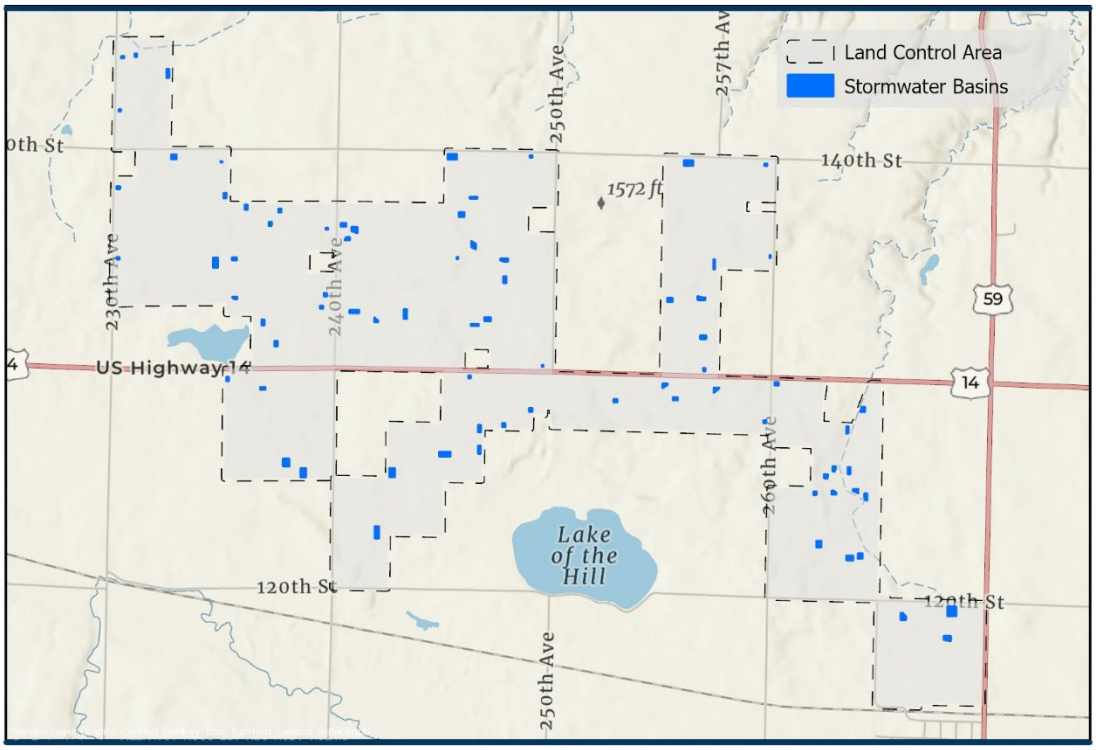
Stormwater Drainage

Coneflower Solar's project design includes 78 stormwater basins, ranging from 700 ft^2 to 46,000 ft^2, scattered throughout the preliminary development area. Stormwater basins are located in existing low areas; the preliminary design avoids locating solar facilities in these areas. Coneflower Solar designed a higher quantity of smaller basins, rather than fewer larger basins, to better suit the existing topography and drainage patterns. The anticipated locations of the stormwater water detention or retention basins, which will be the same in both the MISO Scenario and Garvin Scenario (Figure 16), are preliminary and subject to change as the project design advances.[51] Drainage basin topsoil will be removed and temporarily stored in a designated location. Excavated subsoil will be distributed throughout the project as fill in areas undergoing grading. The segregated topsoil will be replaced, and basins will be vegetated with a wet seed mix used to help stabilize soils after rain.[52]

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 SWPPP, will be developed prior to construction and implemented during construction. The SWPPP will be in accordance with MPCA standards and guidance specific to solar projects and will include erosion and sediment control BMPs. The BMPs detailed in the SWPPP will minimize the potential for downstream water quality impacts throughout project construction and operation.[53]

[51] SPA, p. 21.
[52] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[53] SPA, p. 15.

Figure 16. Preliminary Stormwater Basin Locations



FENCING

Coneflower Solar will install permanent security fencing around the perimeter of the project to prevent public and larger wildlife access. Fencing is anticipated to be woven wire fencing with a height of approximately seven feet from the ground with one foot of three to four strands smooth wire at the top. The perimeter security fence will have 26^{M} or 23^{G} locked gates as permanent access points and $2^{M,G}$ locked gates as temporary access points. Gates will secure the project and prevent unauthorized entry. Either the construction Contractor or a subcontracted fencing company will be engaged to install the perimeter security fencing around the construction units and project substation. High voltage warning signs will also be installed on the fencing.[54] Coneflower Solar will install both motion- and switch-activated, down-lit operational lighting on 10-foot tall poles around the project substation as security lighting. Down-lit, switch-controlled lights will be installed at each inverter for repair purposes.[55]

[54] SPA, Appendix D: Agricultural Mitigation Plan.
[55] SPA, p. 20.

RESTORATION

After construction, restoration of the temporary laydown yards and other disturbance areas will occur. Restoration activities will including final grading, soil decompaction, and seeding. The disturbed areas will be reseeded with native and non-native seed mixes according to the project's VMP and SWPPP.

Coneflower Solar has prepared a draft VMP (Appendix E 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. The VMP has been designed to help Coneflower Solar meet Minnesota's Habitat Friendly Solar Standard[56] and meet the requirements set by the Minnesota Board of Water and Soil Resources (BWSR)[57] in its pollinator guidance documents. Once vegetation at the site has been established, mowing will be done only when necessary to prevent panel shading and address problem weeds or woody species. Mechanical removal and selective spot herbicide treatments may be used to treat certain biennial and perennial noxious weeds and woody species. Coneflower Solar is also maintaining the option to utilize grazing and haying as management tools for the project.[58]

2.1.5 How would the solar facility be operated and maintained?

Coneflower Solar estimates the service life of the project to be 30 years.[59] During the project's operational phase, a small maintenance crew will conduct regular maintenance and monitoring checks of the facilities. The small maintenance crew will be composed of three solar field technicians who will operate the project consistent with applicable state and federal safety regulations. The solar arrays will communicate directly with the SCADA equipment for remote monitoring, reporting, and troubleshooting. SCADA data streams will be remotely monitored 24 hours a day and seven days a week by a qualified subcontractor.

Following commissioning, control of the solar facility will transfer from the construction team to the operations staff. The construction manager will work with the operations staff to ensure a smooth transition from construction to operation. 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 new full-time staff will operate and maintain the project. Operation and maintenance of the project will be conducted by Coneflower Solar, an affiliate, or a contractor.

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. The maintenance plan includes a predictive approach of any devices subjected to derating/degradation.

[56] Minnesota Statute 216B.1642.
[57] Minnesota Board of Water and Soil Resources Habitat Friendly Solar Program.
[58] SPA, Appendix E: Vegetation Management Plan.
[59] SPA, p. 29.

Derating/degradation is the process of components losing efficiency or degrading over the project's lifespan. This is known to occur to technological and physical components, and while a certain amount of derating/degradation is unavoidable, Coneflower Solar has planned for this and will maintain the facility as needed.

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 activities 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 and facilities management, performance monitoring, and snow removal (as needed). Primary maintenance tasks included scheduled inspections of electrical equipment, vegetation management, and snow removal on access drives. The electrical performance of the project will be monitored in real-time by the 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 facility operating data and will be notified of faults and alarms as well as abnormal operations on a real time basis.

During the project's operational phase, there will be one to two trucks on-site daily, and at intervals associated with the planned maintenance schedule (Table 7[60]). The operations crew will also be responsible for performance monitoring and adjustments as well as managing any other contractors involved in the facility, such as the vegetation management services.

[60] SPA, pp. 31-32, Table 4.5-1: Operations and Maintenance Tasks and Frequency.

Table 7. Regular Operations and Maintenance Tasks

Equipment	Task	Frequency
PV Panels	PV panels visual check	Once Yearly
	Wiring and junction boxes visual check	Once Yearly
	PV strings measurement of the insulation	Once Yearly
	PV strings and string boxes faults	Once Yearly
	PV panels washing	As Site-Specific Conditions Warrant
	Vegetation Management	Up to 3x/Year Depending on Site Conditions
Electric Boards	Case visual check	Once Yearly
	Fuses check	Once Yearly
	Surge arresters check	Once Yearly
	Torque check	Once Yearly
	DC voltage and current check	Once Yearly
	Grounding check	Once Yearly
Inverters	Case visual inspection	Once Yearly
	Air intake and filters inspections	Once Yearly
	Conversion stop for lack of voltage	Once Yearly
	AC voltage and current check	Once Yearly
	Conversion efficiency inspection	Once Yearly
	Datalogger memory download	Once Yearly
	Fuses check	Once Yearly
	Grounding check	Once Yearly
	Torque check	Once Yearly
Support Structures	Visual check	Once Yearly
	PV panels toque check on random sample	Once Yearly

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

As the project progresses through its service life and the solar market continues to produce less expensive and more efficient solar panels, Coneflower Solar may determine that repowering the project is a viable option. The decision to initiate repowering could be triggered by aging or faulty equipment, maintenance costs, extending the useful like of the solar panels, or increasing the project's generation output. Any repowering of the Project will abide by all applicable local, state, and federal regulations. Site permits issued by the Commission specify the maximum generating capacity, so if repowering the project increased the generation capacity beyond Coneflower Solar's interconnection request of 235 MW, the existing site permit must be amended or a new site permit sought. At the end of the project's useful life, Coneflower Solar will either take the necessary steps to continue operation of the project (re-permitting and retrofitting) or will decommission the project.[61]

[61] SPA, p. 32.

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. Coneflower Solar provided a draft decommissioning plan as Appendix F of its site permit application.

If Coneflower Solar does not repower the project, they will decommission and remove project facilities. Decommissioning would consist of removing the solar arrays (panels, racking, and steel posts), inverters, fencing, access roads, above-ground and below-ground portions of the electrical collection system, lighting, substation, and gen-tie line. Any below-ground cabling and conduits will be removed to a depth of four feet. Below-ground facilities deeper than 4 feet may remain in place to limit vegetation and surface disturbance.[62]

The total estimated cost to decommission the project, offset salvage/scrap value of solar components, and resulting net estimated decommissioning costs differs between the MISO and Garvin Scenarios. Table 8 provides estimated decommissioning costs for each project scenario. 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.[63]

Table 8. Estimated Project Decommissioning Costs[64]

Project Scenario	Estimated Cost of Decommissioning *(per MW)*	Estimated Salvage Value *(per MW)*	Net Decommissioning Cost *(per MW)*
MISO Scenario	**$21,503,689** *$67,915*	**$42,364,265** *$133,395*	**$20,860,600** *$65,480*
Garvin Scenario	**$21,659,398** *$68,384*	**$42,580,880** *$134,077*	**$20,921,500** *$65,693*

2.2 Project Costs

Coneflower Solar estimates the total capital costs for the project, including construction, operation, and decommissioning, for both the MISO and Garvin Scenarios to be nearly $550 million (Table 9), with the cost for the Garvin Scenario being approximately $1.5 million higher for the 345 kV transmission line.[65] Coneflower Solar indicates that actual total costs may vary up to 15%,[66] as costs depend on the timing of construction, final panel selection, labor costs, taxes, and tariffs. The estimated project decommissioning cost, approximately $20 million, and component salvage value,

[62] SPA, Appendix F: Decommissioning Plan.
[63] Id.
[64] Id.
[65] SPA, p. 4.
[66] EA, Appendix C, Question 13.

approximately $42 million (Table 8), was created using 2024 dollars. The actual cost of decommissioning the project will be dependent on labor costs and the market value of salvageable components at the time of decommissioning. Coneflower Solar considers the estimate accuracy range for the total decommissioning cost to be -10% to +10%.[67]

The project operation and maintenance costs include ground-based yearly inspections, lease payments, operational staff wages, taxes, and other inspection/maintenance. Coneflower Solar estimates the annual operation cost at approximately $5 million.[68]

Table 9. Estimated Project Cost Ranges[69,70]

Project Component	Estimated Cost	
	MISO Scenario	Garvin Scenario
Planning and State Permitting	$2,350,000	
Acquisition and "Downstream" Permits	$100,000	
Design (fully engineered design)	$2,500,000	
Procurement (purchase of all materials)	$108,903, 050	
Construction (equipment and labor)	$254,006,000	
Operation	$157,523,829	
Decommissioning	$21,503,689	$21,659,398
Total Project Cost	**$546,886,568**	**$547,042,277**
Salvage Value	($42,364,265)	($42,580,880)
Net Project Cost	**$504,522,303**	**$504,461,397**

2.3 Project Schedule

Coneflower Solar anticipates the project will begin commercial operation by the end of 2027. Table 10 shows Coneflower Solar's estimated development and construction milestones.

[67] EA, Appendix C, Question 13.
[68] SPA, p. 6.
[69] SPA, p. 6, Table 2.3-1: Estimated Project Costs.
[70] SPA, Appendix F: Decommissioning Plan.

Table 10. Anticipated Project Schedule[71]

Activity	Anticipated Timeframe
Land Acquisition	Completed
MISO Interconnection Application	Q2 2025
Site Permit	Q3 2025
Downstream Permits	Q3 2025
Financing	Q4 2025
Equipment Procurement	Q4 2025
Construction	Q2 2026
Testing and Commissioning	Q3 2027
Commercial Operation Date	Q4 2027
Decommissioning	2055

[71] SPA, p. 7, Table 2.4-1: Project Schedule.

3 Regulatory Framework

Chapter 3 discusses the site permit approval required from the Commission. It further 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). A Certificate of Need is not required for the project because of the exemption provided under Minn. Stat. 216B.243.[72] The exemption applies to "any solar generating system…for which a Site Permit application is submitted by an independent power producer." Coneflower Solar is an independent power producer, and therefore 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 that an EA be prepared and a public hearing be held.[73,] On June 6, 2024, Coneflower Solar filed a Notice of Intent informing the Commission of their plan to submit a site permit application for the project under the alternative review process.[74]

3.3 What permitting steps have occurred to date?

The Commission accepted the site permit application as complete on October 15, 2024. Public information and scoping meetings were held in Tracy, Minnesota on November 12, 2024, and online on November 13, 2024.

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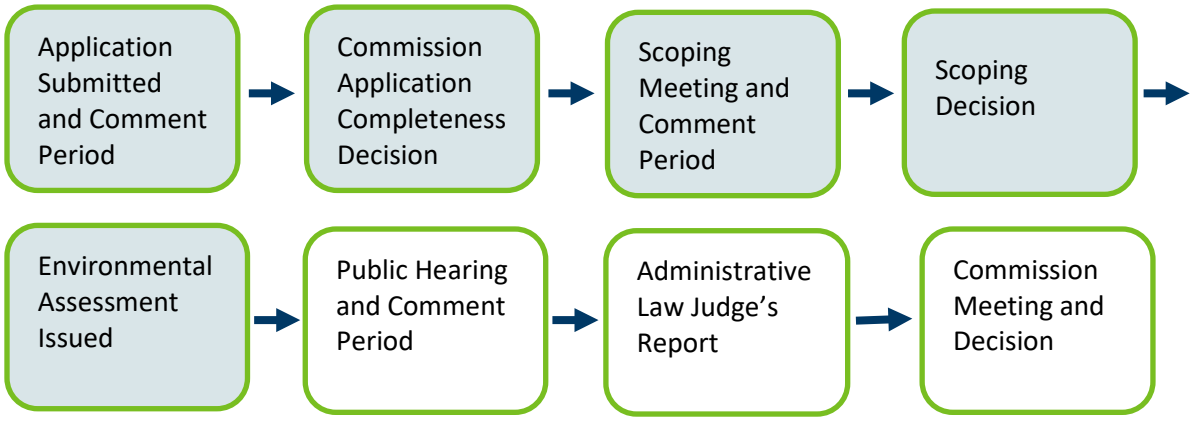
[72] Minnesota Statute 216B.243, subd. 8(a)(7).
[73] Minnesota Statutes 216E.04, subd. 1 and 5; Minn. R. 7850.3700, subp. 1. Applicants are free to elect the alternative process if their project qualifies for it.
[74] Coneflower Solar, Initial Filing, June 6th, 2024, eDockets Number 20246-207488-01.

Application Filing and Acceptance

Coneflower Solar filed an application for a site permit on August 19, 2024.[75] The Commission accepted the application as substantially complete in its order dated October 15, 2024.[76] The order also referred the matter to the Office of Administrative Hearings (OAH) for appointment of an ALJ to conduct a public hearing for the project. Commission staff provided a *Sample Site Permit for a Solar Energy Generating System* on October 24, 2024.[77]

Figure 17 outlines the permitting process as it has unfolded for this project.

Figure 17. Permitting Process Summary[78]



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.[79] The purpose of the public information and scoping meetings is to provide information and answer questions about a proposed project and 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.

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[75] Coneflower Solar Project, Application to the Minnesota Public Utilities Commission for a Site Permit for a Large Electric Generating Facility, August 19th, 2024, eDockets Numbers 20248-209609-01 (through -10), 20248-209610-01 (through -08).
[76] Commission, *Order*, October 15th, 2024, eDocket ID: 202410-211004-01.
[77] Commission Staff, Sample Solar Site Permit, October 24th, 2024, eDockets No. 202410-211289-01.
[78] Read from left to right; shaded steps are complete.
[79] Minn. R. 7850.3700, subp. 2.

On October 29, 2024, the Commission and Commerce issued a joint *Notice of Public Information and Environmental Assessment Scoping Meeting* and associated public comment period.[80] 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 Tracy, Minnesota on November 12, 2024, and an online meeting on November 13, 2024. The comment period closed on December 4, 2024. Approximately 25 people attended the Tracy meeting, and seven attendees provided public comments. One individual provided a public comment at the online meeting.[81] Written comments were received from six citizens, two state agencies, one labor union, and the Bois Forte Band of Chippewa.[82]

Public comments addressed a number of potential impacts and concerns related to the project including labor and employment opportunities; safety concerns related to blowing snow; water basin runoff; financial assurances for cleanup and restoration of the land; aesthetic impacts and property values; economic losses to agricultural suppliers; management of shared drain tile; emergency plans; the health impacts of panel heat and/or glare on humans and wildlife; the loss of recreational and cultural activities; unanticipated discoveries; vegetation removal and management; and the impacts of fencing, dust control, lighting, tree removal, and erosion control methods on wildlife.

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 January 3rd, 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 must be obtained by the permittee prior to construction.[83] Table 11 lists potential downstream permits that might be required, several of which are discussed below.

[80] Commission and Commerce, *Notice of Public Information and Environmental Review Scoping Meeting*, October 29th, 2024, eDocket ID: 202410-211418-01.
[81] Oral Comments on the Scope of Environmental Assessment, Public Scoping and Information Meetings, Tracy, Minnesota, November 12th, 2024 and virtual meeting, November 13th, 2024, eDocket ID: 202412-213040-01.
[82] Written Comments on the Scope of Environmental Assessment, eDocket ID: 202412-212858-01.
[83] EA, Appendix B (DSP), Section 4.5.2 (stating the permittee "shall obtain all required permits for the project and comply with the conditions of those permits").

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."[84] 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 within the project substation.

A permit is required from the U.S. Fish and Wildlife Service (USFWS) for the incidental taking[85] 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 11. 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
	Section 10 Endangered Species Incidental Take Permit	Potential impacts on federally endangered/threatened species	Possible
State			

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

[85] 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
Department of Natural Resources	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
	Public Waters Work Permit	Required to work in public waters	No
	Utility Cross License	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
	Storage Tank Registration	Required for back-up generator aboveground storage tank >500 gallons and belowground storage tank >110 gallons	Possible
	State Air Registration Permit	Required for backup generators if they do not qualify for an exception	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)	Possible
	Oversize/Overweight Permit	Controls use of roads for oversize or overweight vehicles	Possible
	Access Driveway Permit	Required for access driveways off of DOT roads	Possible
	Utility Cross Permit	Required for crossing federal or state highways (transmission line for Garvin Scenario only)	Possible
Department of Health	Well Construction Permit	Installation of a water supply well	Possible
Board of Water and Soil Resources	Wetland Conservation Act	Coordination with BWSR and Lyon County to ensure conservation of wetlands	Possible
Local			

Unit of Government	Type of Application	Purpose	Anticipated for Project
Lyon County (and/or Custer Township)	Overweight/Oversize 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
	Subsurface Sewage Treatment System Permit	Required for septic systems designed with flows up to 10,000 gallons per day	Possible
	Utility Permit	Needed to construct or maintain electrical lines along or across county highway right-of-way	Possible
Lyon 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 Minnesota Department of Natural Resources (DNR). Licenses are required to cross state lands or waters.[86] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a *Public Waters Work Permit*.[87] Utility infrastructure that will be crossing DNR managed lands require the agency to provide a *Utility Crossing License*.[88] 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."[89] The CSW Permit requires use of best management practices; development of a SWPPP; 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, 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

[86] Minnesota Statutes 84.415.
[87] DNR (n.d.) *Requirements for Projects Involving Public Waters Work Permits*, http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.
[88] DNR (2023) *Utility Crossing License,* https://www.dnr.state.mn.us/permits/utility_crossing/index.html
[89] MPCA. *Construction Stormwater*. (2023). https://www.pca.state.mn.us/business-with-us/construction-stormwater

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.[90]

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."[91] 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 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.[92]

A permit from the Minnesota Department of Transportation (MnDOT) is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way (ROW).[93] Coordination would be required to construct access roads or driveways from trunk highways.[94] These permits are required to ensure that use of the ROW does not interfere with free and safe flow of traffic, among other reasons.[95]

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

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

[91] 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.

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

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

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

[95] 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

Lyon County oversees local implementation of the WCA in the project area. The WCA requires that any person "proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value."[96]

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.

Lyon County local permits may be required as a component of this project, including[97]:

- 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.
- Installation of Object/Structures Within County Highway Right-of-Way (Utility Permit) in order to install a utility within the highway right-of-way.
- Subsurface Sewage Treatment Systems Permit which must be given prior to the installation of any individual sewage treatment system in the County.

3.5 Do electrical codes apply?

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

The project must meet requirements of the NESC.[98] Utilities must comply with the most recent edition of the NESC, as published by the Institute of Electrical and Electronics Engineers, Inc., and approved by the American National Standards Institute, when constructing new facilities or upgrading existing facilities.[99] 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

[96] Minnesota. Rule. 8420.0100, subp. 2.
[97] Lyon County, Highway Department Permits: Highway Department - Lyon County; Lyon County, Planning and Zoning Department Permits: Planning and Zoning - Lyon County.
[98] *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).
[99] Minnesota Statute 326B.35.

overhead and underground electric supply lines."[100] They also ensure that facilities and all associated structures are built from materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided operational maintenance is performed.

The project must be designed to meet North American Electric Reliability Corporation's requirements,[101] which define the reliability requirements for planning and operating the electrical transmission grid in North America.[102]

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 and identified in the scoping decision.
- The manner in which landowners are compensated for the use or sale of their land for the project.

[100] 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.
[101] EA, Appendix B (DSP), Section 4.5.1
[102] North American Electric Reliability Corporation (2017) *Standards*, http://www.nerc.com/pa/stand/Pages/default.aspx

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 (Lyon County)

Impacts to resources may extend beyond these distances but are expected to diminish quickly. ROIs vary between resources. Table 12 summarizes the ROIs used in this EA.

Table 12. 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, immediately north of the city of Garvin in Lyon County. The project area is dominated by agricultural land uses and scattered farmsteads, with developed areas in Garvin. Wooded areas are common around the farmsteads. There is also an existing substation in the project area.

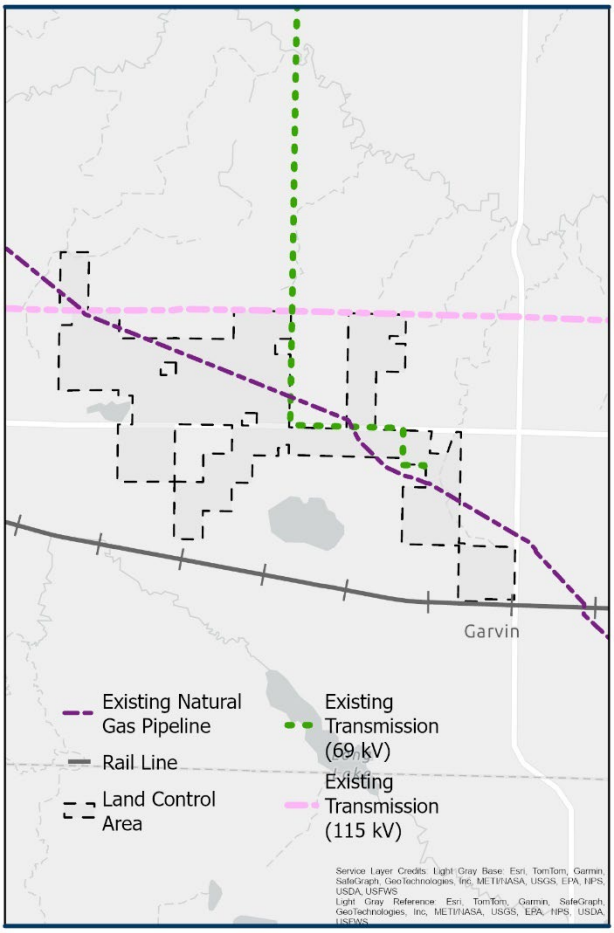
The proposed solar facility is located in Custer Township, adjacent to the northern boundary of the city of Garvin in Lyon County, Minnesota. The solar facility is bisected by US 14 (Figure 1, Figure 2). Views are broad and expansive, but typically interrupted by farmsteads and residences. Most of the structures are fully or partially surrounded by wooded shelterbelts.

The topography of the project site is flat and gently rolling, with the majority of the site in the 0 to 5 percent slope range. Site elevation ranges from 1,518 to 1,550 feet.[103] The topography is underlain by deposits of wind-blown glacial drift overlaying granite, quartzite, sandstone, and shale. The glacial drifts consists largely of till which transition from shallow deposits in the north (10 feet thick) to deeper deposits in the southwest (550 feet thick).

The project is in the Coteau Moraines (251Bb) subsection of the North Central Glaciated Plains Section of the Prairie Parkland Province.[104] Pre-settlement vegetation was primarily tallgrass prairie, with small pockets of wet prairie restricted to narrow stream margins. Forests were limited to ravines along a few streams throughout the area, such as the Redwood River. The current land-use in the project area is predominately agricultural.

Land use within the area of land control is dominated by agriculture; approximately 95 percent of the 2,299.4-acre land control area is currently used for cultivated agriculture (primarily corn and soybeans). Built features common to the area include residences and buildings, paved and gravel roads, and county drainage ditches. There are also several energy infrastructure projects in the region. There are two transmission lines; one 69 kV line, connected to the existing substation, runs east-west along US 14 and north-south along CR 67 through the center of the site, and one 115 kV line, the Lyon County to Lake Yankton line owned by Xcel Energy, runs along the northern portion of the site, parallel to 140th Street. A Northern Border Pipeline Company owned natural gas pipeline runs through the land control area from the northwest to the southeast, and the existing substation bordering the southeastern portion of the project, also owned by Northern Border Pipeline Company, powers their natural gas facility.[105] The Rapid City, Pierre, & Eastern Railroad Inc. has one active rail line that runs east-west directly south of the project (Figure 18).

Figure 18. Project Area Energy Infrastructure



[103] SPA, p. 38.
[104] DNR (n.d.) *Ecological Classification System: Ecological Land Classification Hierarchy*, retrieved from: https://www.dnr.state.mn.us/ecs/index.html
[105] EA, Appendix C, Question 14.

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 14, US 59, CR 63, CR 7, CR 67, 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, or those visiting the recreational opportunities around the project, 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. Generally, an intact and harmonious viewshed is considered by many to be more aesthetically pleasing. Viewsheds might be important regardless of whether they are considered beautiful by the observer, for example, a scattered stone foundation of a historical resource.

Viewer sensitivity is an individual's interest or concern for the quality of a viewshed and varies depending upon the activity viewers are engaged in, their values and expectations related to the viewshed, and their level of concern for potential changes to the viewshed. High viewer sensitivity is generally associated with individuals engaged in recreations activities; traveling to scenic sites for pleasure and to or from recreational, protected, natural, cultural, or historic areas; or experiencing viewshed from resorts, road-side pull-outs, or residences. Residents have a higher sensitivity to potential aesthetic impacts than temporary observers. Low viewer sensitivity is generally associated with individual commuting, working, or passing through an area.

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 19. Existing Viewshed of Coneflower Solar Project – 120th Street

The existing landscape in the project is area is rural and agricultural consisting of flat to gently rolling agricultural crop fields of corn and soybeans, with the surrounding area also supporting a variety of wooded shelterbelts, , natural areas, wetlands and lakes, and drainages. Figure 19 shows the existing viewshed of the southeastern project area off 120th Street. Figure 20 shows the existing viewshed of the central project area off CR 67.

Figure 20. Existing Viewshed of Coneflower Solar Project – CR 67

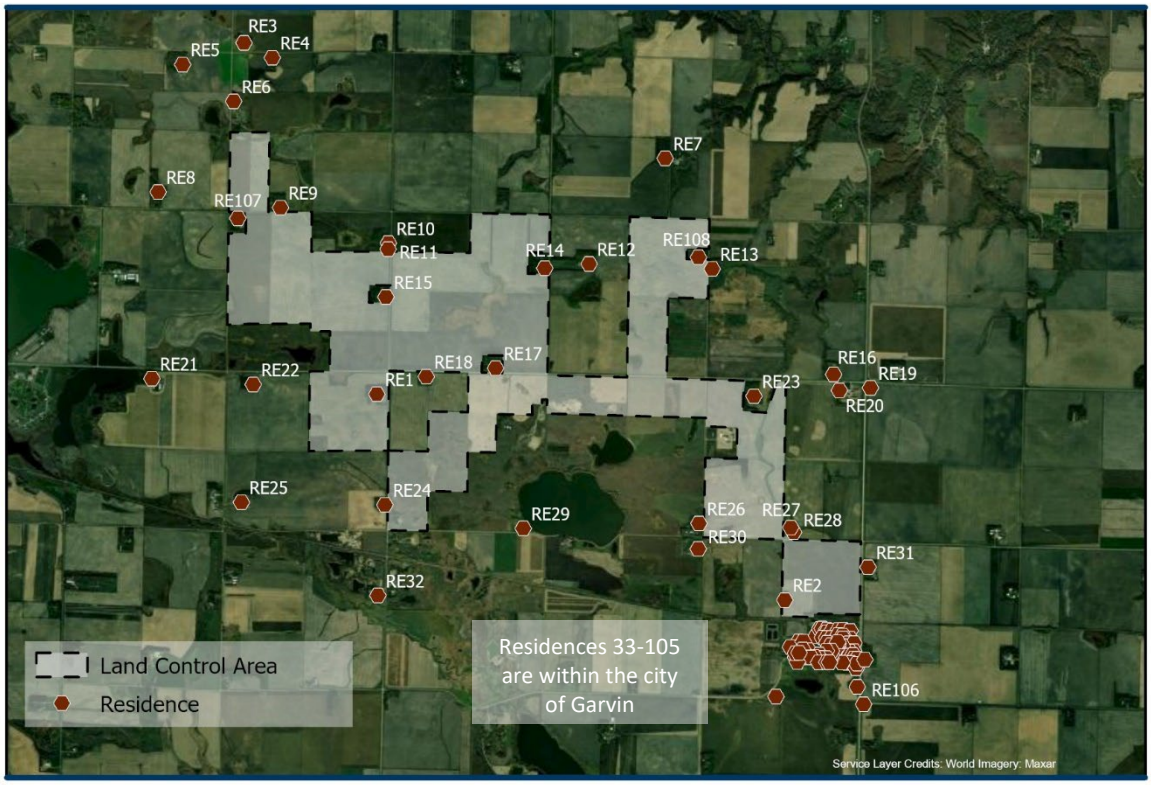
The built environment in the project area includes the city of Garvin south of the project, several agricultural facilities and township and city roads. Existing infrastructure includes two transmission lines, a substation, and a pipeline. Residences and farmsteads are scattered around the nearby landscape, mostly surrounded by woodlands or shelterbelts. The Lake of the Hill and several outdoor recreational opportunities lie south of the project. Figure 21 shows the existing viewshed of the southern project area off 120th Street facing northwest over the Lake of the Hill towards the project.

Figure 21. Existing Viewshed of Coneflower Solar Project – 120th Street

As shown in Figure 22, there are 108 residences within .60 miles of the project site; 72 of these residences are within the city of Garvin. Only 20 of the 108 residences are adjacent to or within the project. Two of these residences, Residences #1 and #2, are surrounded by the area of land control, although only Residence #1 is occupied. Residence #1, located on the west side of CR 7 and south of US 14, is the nearest home to the solar facility, approximately 324 feet from the nearest solar panel[106] and 676.5 feet away from the nearest inverter.[107] Built features common to the area include residences and buildings, paved and gravel roads, drainage ditches, community-scale solar facilities, and transmission lines.

[106] SPA, Appendix G: Map and List of Residences within 3,200 Feet of Project Area.
[107] SPA, pp. 39-42, Table 5.2-1: Proximity of Residences to the Coneflower Solar Project.

Figure 22. Residences within Local Area



POTENTIAL IMPACTS

The visible elements of the solar facility will consist of new PV arrays, transformers and inverters, up to three permanent weather stations, an O&M building (if on site), a new substation, a short 115 kV transmission line,[M] a short 345 kV transmission line,[G] a switchyard,[M] and security fencing surrounding the project.

The project will be a noticeable change in the landscape, converting approximately 1,723.2 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 a substation. The project will be immediately adjacent to the existing substation that powers Northern Border Pipeline Company's natural gas facility. How an individual viewer perceives the change from a field of corn or soybeans 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 on surrounding roads, 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 only be visible for a very short period. For residents traveling on local roads in the project vicinity, such as CR 7 or 240th Avenue, and for others with high viewer sensitivity, such as residents using the recreational resources

surrounding the project, aesthetic impacts are anticipated to be moderate to significant. While the existing tree cover does minimize impacts to the viewshed when looking north towards the project from city of Garvin, some degree of visibility will remain. The extent of visibility from each residence will vary based on factors such as the viewer's location within the property, the time of day, and the degree of foliage on the vegetation.[108] Construction of the project may require some tree removal within the land control area. The existing trees within the land control area may be a valued part of an adjacent residence's viewshed, and their presence along the project boundaries can provide additional vegetative screening for residential properties. Tree clearing within the project could increase aesthetic impacts to adjacent residences by altering the viewshed they associate with their home and removing the vegetative screening bordering their property, increasing the visibility of the project.

Current fields of corn and soybeans 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 12 feet off the ground at maximum tilt.[109] Construction of the new 5-acre project substation, the utility-owned switchyard,[M] scenario-associated transmission lines, and the 3-acre O&M building area will also present new visual impacts. If built on site, the O&M building will include the SCADA system, an area for maintaining and storing equipment, and a parking lot. The 345 kV overhead transmission line for the Garvin Scenario will be constructed with steel monopole structures not anticipated to exceed 165 feet in height, and the entire length of line will be less than 1 mile.[G] In addition, an existing 115 kV transmission line and 69 kV transmission line are presently located adjacent to and within the land control area.

PV panels are designed to absorb light to convert the light to electricity. The reflection of light from a solar panel is undesirable, as it results in losses to the panel's electricity generation capacity. When light reaches the interface between two transparent materials with different refractive indexes, such as air and glass, it is both refracted and reflected, a phenomenon known as Fresnel's Law. Only the refracted light crosses the interfaces and continues passing through to the next material, resulting in an incremental loss of light transmission. These transmission losses are compounded as light passes through the consecutive transparent layers in a solar panel to reach the photovoltaic cell, resulting in an optical loss of electrical power.[110] To combat these losses, modern-day solar modules come equipped with an anti-reflection coating similar to the type on eyeglasses. These coatings reduce optical losses by applying destructive interference that cancels out the light reflected by the top surface of the module and the photovoltaic cell, increasing solar panel efficiency. The result is a 99% reduction in glare.[111] Residents who live adjacent to the solar facility or use the recreational resources surrounding the project will not experience viewsheds interrupted by glare from the solar panels, and aesthetic impacts resulting from glare are not anticipated.

[108] EA, Appendix C, Question 3.
[109] SPA, p. 17.
[110] Shanmugam, N., Pugazhendhi, R., Elavarasan, R.M., Kasiviswanathan, P., & Das, N. (2020). Anti-Reflective Coating Materials: A Holistic Review from PV Perspective. DOI: 10.3390/en13102631.
[111] EA, Appendix C, Question 1.

Down-lit security lighting will be installed at the gates to the facility as well as outside the project substation, around each inverter, and along the perimeter fence as necessary for safety and security. Lighting will be both motion- and switch-activated and down lit to minimize impacts and effects.[112] 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 B**. 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. The project has been designed to minimize tree clearing and maintain existing views to the extent practicable. Coneflower Solar anticipates minimal, if any, tree clearing will be required for the project and would primarily occur along windbreaks between agricultural fields.

Site-specific landscaping plans can minimize visual impacts to adjacent land uses and homes through vegetation screening, berms, or fencing. Coneflower Solar indicates that although the 20 nearby residences have some natural vegetation screening from the project, further discussion with affected landowners is in progress. Coneflower Solar will work with adjacent landowners to determine the need for additional vegetation screening and landscaping to minimize aesthetic impacts of the project. Section 5.1 of the DSP is a special condition that requires the permittee to supplement existing vegetative screening to minimize the views of project infrastructure at adjacent residences.

The specifics of the individual agreements with landowners for supplemental vegetation covering residences are not within the scope of this EA.

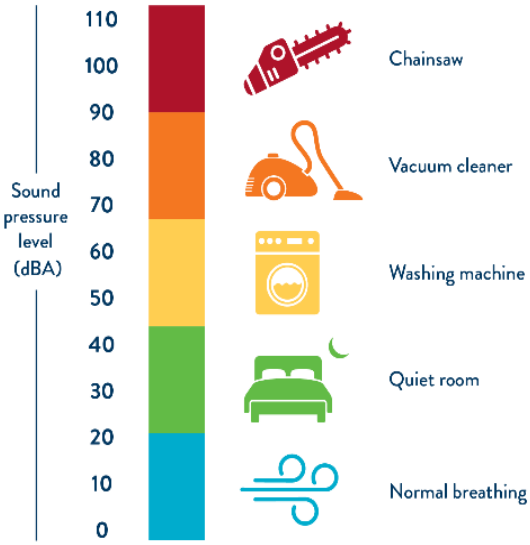
No additional mitigation is proposed.

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 to minimal**.

[112] SPA, p. 20.

Figure 23. Common Noise Levels



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.[113] 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 23 provides decibel levels for common indoor and outdoor activities.[114]

Because sound levels are measured on a logarithmic scale, they are not directly additive. "A doubling of sound energy yields an increase of three decibels."[115] For example, if a sound level of 50 dBA is added to another sound level of 50 dBA, the total sound level is 53 dBA, not 100 dBA. This change in sound level (three dBA) would be barely detectible.

All noises produced by the project must be within state noise standards.[116] Noise standards in Minnesota 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 limit to the maximum loudness of a noise. Table 13. Noise Area Classifications (dBA) provides current Minnesota noise standards.

[113] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[114] Federal Aviation Administration (February 9, 2018) *Fundamentals of Noise and Sound*, retrieved from: https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/.
[115] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[116] Minnesota Rule 7030.0050.

Table 13. 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 ROI for noise is the project vicinity (1,600 feet). The primary noise receptors are the local residences. Coneflower Solar identified a total of 108 noise receptors (residences) within 0.6 miles of the project. One receptor is within the land control area (Residence #1, Figure 22), and 17 receptors are immediately adjacent to the project.[117] The identified receptors were categorized by distance from the project (Table 14); the majority of residences are at least 800 feet away from the project.

Table 14. Noise Receptor Distance Distribution[118]

Distance from Project (feet)	# of Residences
<50’	3
50’ – 100’	3
100’ – 200’	7
200’ – 400’	7
400’ – 800’	18
800’ – 1600’	48
1600’ – 3200’	22

[117] SPA, pp. 39-42, Table 5.2-1: Proximity of Residences to the Coneflower Solar Project.
[118] SPA, p. 55, Table 5.2-6: NSA Distance Distribution.

The proposed project is in a rural, agriculturally dominated area. Rural noise levels typically range from 30-55 dBA depending on the activity, time-of-day, weather, and season. The project vicinity's existing sound character also includes audible traffic sounds from roadways[119] such as US 14, which bisects the project, and operational sounds from the existing substation owned by Northern Border Pipeline Company, which is adjacent to the southeastern portion of the project. Residences are in NAC 1. The recreational resources surrounding the project are in NAC 2. Noise receptors include individuals within their residences, working outside in the project vicinity, and using the surrounding recreational resources. Potential noise impacts from the project are associated with construction noise and operational noise.

Construction

Distinct noise impacts during construction are anticipated to be minimal to significant depending on the activity occurring and equipment being used. Noise from construction will be temporary, intermittent, limited to daytime hours and localized. Sound levels from grading equipment are not dissimilar from the typical tractors and larger trucks used in agricultural communities during harvest. The noise from construction activities would dissipate with distance and be audible at varying decibels, depending on the distance from the equipment to the receptor.

Major noise producing activities related to installation of the solar arrays are associated with clearing and grading, material delivery, and driving foundation posts. The intermittent noise created by the construction vehicles and equipment used for these activities will be limited by the NAC-1 L_{10} metric. The majority of the construction equipment that could be used on the site, such as grading equipment, man-lifts, and compactors, is anticipated to generate noise between 76-85 dBA.[120] Pile driving of the rack supports, or the helical pile equipment if the applicant decides to use helical piles, will be the most significant source of construction noises. The United States Department of Transportation guidance showed the noise from power hammers to be approximately 101 dBA at 50 feet.[121] Factoring in sound dissipation over distance, calculated as a six decibel decrease for every doubling in distance[122], the noise from power hammers would meet the NAC-1 daytime L_{10} metric (65 dBA, Table 13) at 3,200 feet (0.6 miles).

There are 106 occupied residences are within 3,200 feet of the project;[123] a table listing the distances of all 106 occupied residences to project components can be found in **Appendix E.**[124] The closest residence to project components (Residence #1, Figure 22) is approximately 324 feet from the nearest

[119] SPA, p. 54.
[120] SPA, p. 55.
[121] U.S. Department of Transportation. (2017). *Construction Noise Handbook*. Retrieved from: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook00.cfm
[122] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[123] SPA, Appendix G: Map and List of Residences within 3,200 Feet of Project Area.
[124] EA, Appendix E

solar array.[125] Thus, this construction noise would likely exceed state noise standards at select times and locations if it is continuous for at least six minutes. 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 will take longer but would be quieter.

Other construction activities, for example, installation of solar panels, are anticipated to have noise impacts similar to general construction equipment (76-85 dBA). 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. Noise related to grading (estimated to be 76-85 dBA at 50 feet) is anticipated to last approximately four weeks, and noise related to pile driving (estimated to be 101 dBA at 50 feet) is anticipated to last up to six weeks.[126]

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, typically characterized as a slight hum or buzz, as well as the rotation of the tracking system, although some minor noise may be generated from the short transmission line[M] or from wind blowing through the conductors and structures.

Noise levels are expected to be constant throughout the day and lower during non-daylight hours. The steady sound of facility operation will be limited by the NAC-1 L_{50} metric. Coneflower modeled the distance at which operational noise levels would be in compliance with the daytime L_{50} dBA noise standard of 60 dBA and the nighttime standard of 50 dBA (Table 15).

Table 15. Operational Noise Levels[127]

Facility Type	Distance to 50 dBA (feet)	dBA at 50 feet
Inverter/Transformer	141	59.0
Tracker	29	45.0

Operational noise modeling demonstrates that the project will meet the NAC-1 nighttime L50 dBA noise standard. The nearest residence to the project is approximately 324 from the nearest solar array, 295 feet further than the distance at which tracker noise meets the nighttime L50 standard, and 677 feet from the nearest inverter, 536 feet further than the distance at which inverter noise meets the nighttime L50 standard. Factoring in sound dissipation over distance, calculated as a six

[125] SPA, pp. 39-42, Table 5.2-1: Proximity of Residences to the Coneflower Solar Project.
[126] SPA, p. 55.
[127] SPA, p. 56, Table 5.2-7 – Inverter and Tracker Noise Levels

decibel decrease for every doubling in distance[128], the nearest residence would experience operational noise from tracker rotation between 27-33 dBA and operational noise from inverters/transformers between 35-41 dBA. Thus, the operational sound levels anticipated at the nearest residence will be similar to the sound levels of a quiet room (Figure 23), and comparable to background noise levels in the area.

Operational noise for individuals using the surrounding recreational land will also be comparable to the background noise levels in the area. Any individual utilizing the surrounding recreational resources, classified as NAC 2, will be far enough from the project that operational sound levels will actually reach NAC-1 compliance levels. The nearest point within the adjacent public lands to the project is approximately 205 feet from the nearest solar module, 176 feet further than the distance at which tracker noise meets the nighttime L50 standard, and 470 feet from the nearest inverter, 329 feet further than distance at which inverter noise meets the nighttime L50 standard. Individuals will be able to enjoy the recreational resources surrounding the project without being disturbed by operational noise from the project.

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.

Section 4.3.7 of the proposed DSP (**Appendix B**) 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.

Section 5.2 of the DSP is a special condition that requires the permittee to provide notice to adjacent residences detailing when major noise-producing construction activities are planned to occur.

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. Impacts are anticipated to be long-term, and **minimal to moderate**. Impacts are unavoidable.

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

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 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 Lyon County derive primarily from European ancestry. Cultural values are also informed by work and leisure pursuits, for example, farming and hunting, 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

Solar energy experiences a relatively high degree of acceptance at the socio-political level and greater public favor compared to other kinds of renewable energy.[129] The project contributes to the growth of renewable energy and is likely to strengthen and reinforce this value in the area. However, the support for renewable energy projects seen in the general public does not necessarily extend to the local level when it comes to project implementation.[130] Social acceptance of renewable energy projects is increasingly recognized as a significant factor to address this "social gap" seen in local communities.[131]

The development of the project will change the character of the area, converting approximately 1,723 acres of farmland to an energy generating facility. 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. Even at a small-scale, solar projects can have a major impact

[129] Wüstenhagen, R., Olsink, M., & Bürer, M.J. (2007). *Social acceptance of renewable energy innovation: An introduction to the concept.* DOI: https://doi.org/10.1016/j.enpol.2006.12.001

[130] Bell, D., Gray, T., & Haggett C. (2007). *The 'Social Gap' in Wind Farm Siting Decisions: Explanations and Policy Responses.* DOI: https://doi.org/10.1080/09644010500175833

[131] Wüstenhagen, R., Olsink, M., & Bürer, M.J. (2007). *Social acceptance of renewable energy innovation: An introduction to the concept.* DOI: https://doi.org/10.1016/j.enpol.2006.12.001

on a resident's attachment to place.[132] Larger solar installations are found to evoke stronger emotions in individuals,[133] and residents may feel that a project of this size does not fit the area.[134]

Lyon County strives to promote development while preserving the County's rural character and support the long-term protection of agriculture.[135] The proposed project is immediately adjacent to the city of Garvin. The project's proximity to Garvin may heighten its visibility; some residents may see the conversion of the gently rolling agricultural fields north of Garvin to solar arrays as an encroachment on the small farm-town atmosphere of the area. The project is designed to serve the state of Minnesota, but the potential impacts to cultural values will be experienced at the local level. This tension between infrastructure projects and rural character creates real tradeoffs.

MITIGATION

One strategy that can help mitigate the cultural impacts of large-scale renewable energy projects is the development of a benefits agreement. These agreements, formed between the project owner and host community, can be tailored to support priorities unique to the host community. Collective benefit agreements for renewable energy project host communities have been used in various European countries for over a decade,[136] and the U.S. Department of Energy recently formalized the development of benefit agreements for projects awarded funding through the 2021 Bipartisan Infrastructure Law.[137] Community investment funds, scholarships, and training programs are all examples of collective benefits that can be included in benefits agreements as means to mitigate the impacts of renewable energy projects. Further discussion of benefit agreements can be found in Section 4.12 (Cumulative Potential Effects).

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

[132] Shyu, C. (2025). *Energy justice-based community acceptance of local-level energy transition to solar photovoltaic energy*. DOI: https://doi.org/10.1016/j.egyr.2024.12.029

[133] Cousse, J. (2021). *Still in love with solar energy? Installation size, affect, and the social acceptance of renewable energy technologies*. DOI: https://doi.org/10.1016/j.rser.2021.111107

[134] Roddis, P., Roelich, K., Tran, K., Carver, S., Dallimer, M., & Ziv, G. (2020). *What shapes community acceptance of large-scale solar farms? A case study of the UK's first 'nationally significant' solar farm*. DOI: https://doi.org/10.1016/j.solener.2020.08.065

[135] Comprehensive Planning Task Force. *Lyon County Comprehensive Plan.* (2002). https://www.lyonco.org/departments/planning-and-zoning/comprehensive-plan.

[136] Glasson, J. (2017). *Large Energy Projects and Community Benefits Agreements – Some experience from the UK*. DOI: https://doi.org/10.1016/j.eiar.2017.03.009

[137] Office of Clean Energy Demonstrations. *Guidance for Creating a Community Benefits Plan for the Bipartisan Infrastructure Law Energy Improvement in Rural or Remote Areas Fixed Award Grant Program*. Retrieved from: file:///C:/Users/EU01240906/Downloads/DE-FOA-0003045_BIL_ERA_Grant_Program_CBP_Guidance.pdf

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.

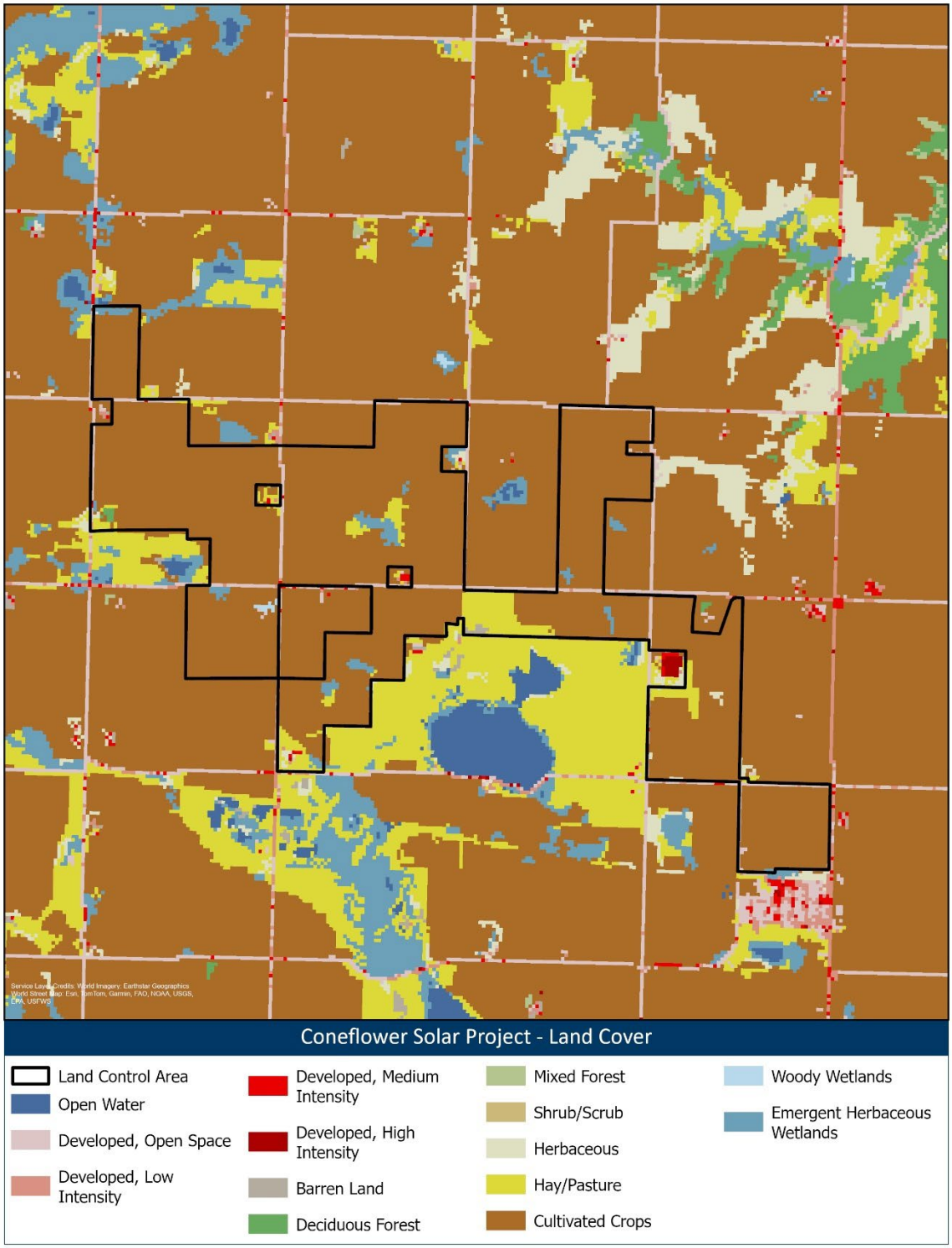
Land use is the characterization of land based on what can be built on it and how the land is used. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. Land cover documents how much of a region is covered 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. As shown in Table 16[138] and Figure 24, the project land cover is dominated by cultivated agriculture, with scattered areas of wetlands, trees, grasslands, and developed areas around farmsteads.

Table 16. Land Cover

Category	Land Control Area (Acres)	Percentage
Agricultural Lands		
Cultivated Cropland	2,063.0	89.7
Hay/Pasture	109.8	4.8
Developed Areas		
Developed, Open Space	65.2	2.8
Developed, Low Intensity	5.4	0.2
Developed, Medium Intensity	2.2	0.1
Developed, High Intensity	0.5	<0.1
Wetlands/Open Water		
Emergent Herbaceous Wetlands	38.1	1.7
Woody Wetlands	2.9	0.1
Open Water	<0.1	<0.1
Herbaceous		
Grassland/Herbaceous	7.0	0.3
Forest		
Deciduous Forest	2.5	0.1
Barren Land	2.9	0.1
Total	**2,299.4**	100%

[138] SPA, p. 97, Table 5.5-7: Land Cover within the Project Area.

Figure 24. Project Area Land Cover



A site permit from the Commission supersedes local zoning, building, or land use rules.[139] 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."[140] The area of land control is located within Custer Township in Lyon County. The solar facility is zoned as Agricultural according to Lyon County zoning data, and future land use within the land control area has been designated as an Agricultural Preservation Area.[141] There are no urban growth boundaries or orderly annexation areas associated with Garvin.[142]

Table 17 summarizes the performance standards for solar energy farms codified in Section 21 of the Lyon County Zoning Ordinance.[143] Custer Township does not have its own zoning regulations.

Table 17. Lyon County Performance Standards for Solar Farms

Standard	Lyon County Renewable Energy Regulations
Location	Cannot be located in the: • Unincorporated Village • Shoreland District
Power & Communication Lines	Underground, to the extent practicable
Minimum Setbacks	• Neighboring Property Lines: 25 feet • Dwelling Sites: 200 feet • Public Conservation Lands: 200 feet • Road Right-of-Way: 25 feet
Stormwater Management and Erosion Control	• Meets the requirements of the MPCA CSP requirements.
Foundations	• Manufacturer's engineer (or other qualified engineer) certification that the foundation and design of panels is within accepted professional standards, given local soil and climate conditions.
Other Standards/Codes	• In compliance with any applicable local, state, and federal regulatory standards (e.g., State of Minnesota Uniform Building Code, National Electric Code, etc.)

[139] Minnesota Statutes 216E.10, subd. 1.
[140] Minnesota Statutes 216E.03, subd. 7.
[141] Lyon County. (2002). *Future Land Use Map*, retrieved from: https://www.lyonco.org/home/showpublisheddocument/172/637012970335400000
[142] Lyon County. (2012). *Lyon County Zoning Map*, retrieved from: https://www.lyonco.org/home/showpublisheddocument/3995/637054664256770000
[143] Lyon County Zoning Ordinance, Section 21: Renewable Energy Ordinance (REO), retrieved from: https://www.lyonco.org/home/showpublisheddocument/206/637012974464430000

Lyon County's Comprehensive Plan[144] sets forth the following project relevant goals for their agricultural districts and environmental features:

- Identify prime agricultural areas and develop effective strategies to ensure their preservation and viability (Land Use Goal 2, #6).
- Continue to explore wind power and other renewable options (Natural Resources Goal 1, #24).

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, at least 30 years. 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 substation.

The project is expected to be compatible with county planning goals and zoning ordinances. Coneflower Solar states that it will apply the structure setback to its facilities in a manner consistent with Lyon County setback requirements.

Individual perspective largely determines whether the project aligns with Lyon County's Comprehensive Plan. Individuals might believe the project is compatible with local planning goals because it furthers the county's goals of exploring renewable options as a method to protect and preserve certain areas. However, the project will remove agricultural land from production, which could be interpreted as being incompatible with the county's goals to preserve agricultural land.

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. The applicant has indicated that the project will be decommissioned such that agricultural activities can resume once decommissioning has been completed. Thus, any project land temporarily leased from participating landowners will return to furthering the Lyon County's goals of preserving the viability of agricultural land once decommissioned.

Mitigation

The project would convert approximately 1,723 acres of cultivated cropland to solar energy production. Although the project is subject to oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, Coneflower Solar will continue to coordinate with Lyon County on other potential permits for the project. Many of the county ordinances have to do with the preservation of agricultural land.

[144] Comprehensive Planning Task Force. *Lyon County Comprehensive Plan.* (2002). https://www.lyonco.org/departments/planning-and-zoning/comprehensive-plan.

The DSP (**Appendix B**) 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 E 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 D 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 F of the site permit application.
- Section 9.2 requires removal of all project-related infrastructure.

Impacts to county zoning can be mitigated by ensuring the project is consistent, to the greatest extent practicable, with Lyon County's renewable energy ordinance. The applicant states that the project is consistent with the Lyon County zoning ordinances and comprehensive plan for development.

No additional mitigation is proposed.

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.[145]

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, this project would not generate emissions through the energy production process. 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 and limited in geographic scope.

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).[146] 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 0.5 miles 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 0.5 miles. The 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, such as increased funding to local schools, which might positively impact home sale prices.

Site-specific information should be considered when comparing the project to this study. The project will be over 12 acres on agricultural land in a rural area, making it relevant to the type of development that had statistically significant findings in the study. There are 20 residences adjacent to the land control area of the project, e.g., in proximity to where physical structures will be constructed, 18 of which are occupied. Without taking other factors into consideration, these properties could experience minimal to moderate property value impacts.

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[145] 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/.

[146] Elmallah, S., Hoen, B., Fujita, K.S., Robson, D., & Brunner, E. (2023). Shedding light on large-scale solar impacts, Retrieved from: https://www.sciencedirect.com/science/article/pii/S0301421523000101 .

Considerations such as setbacks, benefits to the community, economic impact, and vegetative features could influence property values. For instance, project facilities are expected to comply with Lyon County Zoning Ordinance setbacks. Additionally, several of the potentially affected properties have vegetative screening. All 18 occupied residences adjacent to the land control area have some level of vegetative screening present on their property, but full vegetative screening is lacking at 11 of these residences.[147] Coneflower Solar indicates that they will consult with adjacent landowners on the use of vegetative screening to minimize views of the project. Even with supplemental vegetative screening, the project infrastructure may be visible from certain vantage points on the property and under certain conditions.

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.[148] 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.[149] Similar studies outside of Minnesota found that proximity to a solar farm leads to a depreciation of 1.7 to 5.4% in property values.[150,151]

Potential Impacts

Impacts to the value of specific properties within the project vicinity are difficult to determine but could occur. Because of this uncertainty, impacts to specific properties could be minimal to moderate, but are expected to be within 0.5 miles of the project and to decrease with distance from the project and with time. The study-specific analysis of the area determined that the 11 residences lacking extensive vegetative screening are most likely to have increased potential impacts on their property values.

Based on analysis of other utility-scale solar projects, significant negative impacts to property values in the project vicinity are not anticipated. Aesthetic impacts to property values would be limited to residences and parcels in the project vicinity where the solar panels are easily visible.

In addition to aesthetic impacts, neighbors in proximity to the proposed project voiced several specific concerns regarding the project's effect on their property resale values, noting that impacts to wildlife, outdoor recreation opportunities, and the potential loss of screening trees located within the project

[147] SPA, pp. 39-41, Table 5.2-1: Proximity of Residences to the Coneflower Solar Project.
[148] Kurt Schneider, Environmental Services Director, (October 20, 2017) *Email to Commerce staff*.
[149] 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 \
[150] Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island, September 2020. Retrieved from: https://www.uri.edu/news/wp-content/uploads/news/sites/16/2020/09/PropertyValueImpactsOfSolar.pdf
[151] The Disamenity Impact of Solar Farms: A Hedonic Analysis, February 2023. Retrieved from: https://le.uwpress.org/content/99/1/1

and adjacent to resident properties should be considered.[152] All three identified topics can individually impact property values; the presence of tree cover both on and off the homeowner's property,[153] proximity to wildlife habitat,[154] and access to outdoor recreational opportunities[155] all result in increases to property values. Each of these topics have their own sections in the EA (Section 4.3.1 – Aesthetics, Section 4.3.6 – Recreation, and Section 4.7.7 – Wildlife). As such, potential impacts and mitigation related to these topics are addressed in their individual sections, as opposed to here, with the understanding that mitigating effects may also reduce impacts to property values.

MITIGATION

Impacts to property values can be mitigated by reducing aesthetic impacts and impacts to future land use. Impacts can also be mitigated through individual agreements with neighboring landowners; such as the individual vegetation screening plans developed as part of Section 5.1 of the DSP. As stated in the previous discussion on aesthetic impacts, the specific details of agreements with individual landowners are not within the scope of this EA.

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 to moderate**. 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. The loss of a Walk-In-Access site is a long-term impact from this project. Users of local WMAs and WPAs may find their outdoor recreational activities less enjoyable due to aesthetic impacts of the project.

In 2023, the leisure and hospitality industry in Lyon County accounted for about $71,638,323 in gross sales, and 1,072 private sector jobs.[156] Recreation and tourism in the project area are largely related to activities including hunting, fishing, wildlife viewing, and snowmobiling. Activities in the project area are associated with Wildlife Management Areas (WMAs), Waterfowl Production Areas (WPAs), Walk-In Access Areas (WIAs) for hunting, snowmobile trails, and the Lake of the Hill. The Garvin Park and Balaton Golf Course are approximately 1 mile northeast and west of the project, respectively.

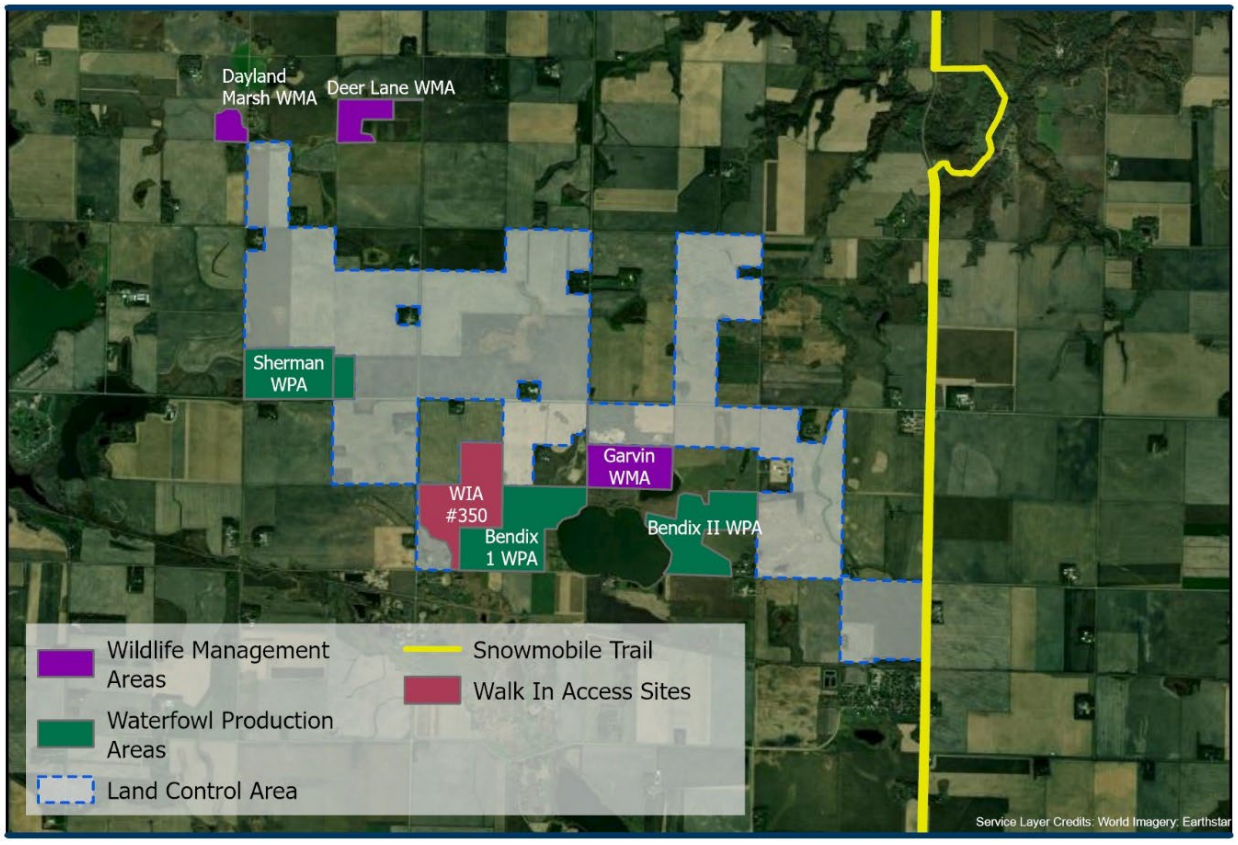
Impacts to tourism and recreation can be direct or indirect. Direct impacts are impacts that directly impede the use of a recreational resource, for example, closing of a trail to facilitate project

[152] Written Comments on the Scope of Environmental Assessment, eDocket ID: 202412-212858-01.
[153] Kovacs, K., West, G., Nowak, D., & Haight, R. (2022). *Tree cover and property values in the United States: A national meta-analysis*. DOI: https://doi.org/10.1016/j.ecolecon.2022.107424
[154] Liu, X., Taylor, L., Hamilton, T., & Grigelis, P. (2013). *Amenity values of proximity to National Wildlife Refuges: An analysis of urban residential property values*. DOI: https://doi.org/10.1016/j.ecolecon.2013.06.011
[155] Kovacs, K. (2012). *Integrating property value and local recreation models to value ecosystem services from regional parks*. DOI: https://doi.org/10.1016/j.landurbplan.2012.08.002
[156] Explore Minnesota (n.d.) *2023 Leisure & Hospitality Industry Data*, retrieved from: https://mn.gov/tourism-industry/assets/2023%20MN%20L%26H%20Data_tcm1135-665060.pdf

construction. Indirect impacts reduce the enjoyment of a recreational resources but do not prevent use, for example, aesthetic impacts visible from a scenic overlook.

The Garvin WMA and Bendix I & II WPAs surrounding the Lake of the Hill are directly adjacent to the southcentral project boundary, and the Sherman WPA is directly adjacent to the western project boundary. The Lyon WIA #350 is within the southwestern section of the project. The Dayland Marsh and Deer Lane WMAs surround the northwest corner of the project. There is one state snowmobile trail that runs north-south parallel to US 59, east of the project. The trail is maintained by the Southwest Ridge Runners Snowmobile Club. Figure 25 shows the location of recreational opportunities within the project area.

Figure 25. Project Area Recreation and Tourism



Potential Impacts

Impacts to tourism and recreation are anticipated to be minimal to moderate. 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. However, these impacts will be temporary.

Long-term impacts to recreational activities include the removal of the 135-acre Lyon WIA #350 from use as a recreational hunting resource. Lyon WIA #350 is the 5th largest WIA in Lyon County. The

contract for Lyon WIA #350 expires in June 2025.[157] The decision to reenroll land in the WIA program is at the discretion of the landowner, and it is possible that Lyon WIA #350 would have been removed as a recreational resource once the contract expires in June 2025 regardless of whether the project was proposed.

Additional long-term impacts related to aesthetics may be felt by individuals engaging in recreational activities at the WMAs and WPAs or using the snowmobile trail adjacent to the project. The relatively flat terrain and general lack of vegetative screening makes it likely that facility components will be visible in certain areas within the WMAs and WPAs and along certain sections of the snowmobile trail. While this change in viewshed will not directly impact an individual's ability to engage in a recreational activity, viewers with high sensitivity may find outdoor recreational activities less enjoyable if the natural viewshed is disrupted by solar facility components.

MITIGATION

The project will not disturb or impede residents from engaging in the surrounding recreational opportunities. However, the lands surrounding the project are an important recreational resource for the community, and residents have been hunting and fishing in the area for generations. While the change in the viewshed surrounding these recreational resources will not prevent residents from utilizing them, some residents may feel that the presence of the project diminishes the recreational value of said resources. Section 4.12 (Cumulative Potential Effects) identifies a potential mitigation measure that can address these impacts.

No additional mitigation measures are proposed.

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.

Water and Wastewater

Most residents in the surrounding rural area have private septic systems and or/drain fields and water supply wells. The Minnesota Well Index (MWI) identified no wells within the land control area.[158]

Electric Utilities

[157] SPA, p. 67.
[158] Minnesota Department of Health. *Minnesota Well Index.* [Online] [Cited: March 4, 2025]. Retrieved from: https://mnwellindex.web.health.state.mn.us/

The primary electric provider in the project area is Xcel Energy, which provides electricity in Lyon County. Xcel Energy owns the existing 115 kV transmission line running east-west adjacent to and bisecting the northern section of the project (Figure 18). In addition to the high voltage transmission lines, there are lower voltage electric distribution lines throughout the project area.

Pipelines

There in one natural gas transmission pipeline within the land control area, TC Energy's Northern Border Pipeline. The pipeline travels southeast-northwest through the project (Figure 18). There are two other natural gas transmission pipelines within one mile of the project, located to the northwest.

Roads

The are two major roadways adjacent to or bisecting the project, US 14, which runs east-west through the middle of the project, and US 59, which runs north-south along the southeastern edge of the project. Additionally, there are three county roads adjacent to or bisecting the project. CR 67 Avenue runs north-south through the center of the project, CR 7 Avenue runs north-south through the middle of the western section of the project, and CR 63 Avenue runs adjacent to the western edge of the project.

The four remaining roads adjacent to or bisecting the project are all township roads, two running east-west and two running north-south. The east-west township roads adjacent to and bisecting the project are 140th Street, in the northern section of the project, and 120th Street, in the southern section of the project. The north-south township roads adjacent to or bisecting the project are 265th Avenue, in the southeastern section of the project, and 260th Avenue, in the middle of the eastern section of the project. Table 18 summarizes the Average Annual Daily Traffic (AADT) counts for county and state roads within or adjacent to the project.[159] Traffic counts are not available for township roads. Coneflower Solar plans to access the project from US 14, CR 7, CR 63, and 140th Street (Figure 10), with the possibility of minor field access.

Table 18. Average Annual Daily Traffic Within or Adjacent to the Project Area

Roadway	Year	AADT Traffic Volume Total
US 14	2023	1,486
US 59	2022	2,957
CR 7	2022	758
CR 63	2022	38
CR 67	2022	55

[159] Minnesota Department of Transportation. *Traffic Mapping Application*. [Online] [Cited: March 5, 2025.] Retrieved from: https://mndot.maps.arcgis.com/apps/webappviewer/index.html?id=7b3be07daed84e7fa170a91059ce63bb

Railroads

There are no railroads located within the land control area, however, a Rapid City, Pierre, & Eastern Railroad Inc. owned line runs east-west adjacent to the southern boundary of the project, near the city of Garvin.[160]

Airports

There are no Federal Aviation Administration (FAA) registered airports located in the project area, or within 5 miles of the project. The nearest FAA-registered airport is the Tracy Municipal Airport, located 7.5 miles east of the project. There are no private airstrips located in the project area, or within 5 miles of the project. The closest private airstrip is located in the City of Westbrook, MN, approximately 27 miles southeast of the project.[161]

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.

Housing

There are around one thousand vacant housing units in Lyon County, but available housing in proximity to the project is much more limited. The city of Garvin, which is the closest location to the proposed project, has only 1 available housing unit, and Custer Township has only 10 available housing units (Table 19).

Table 19. Housing Characteristics*

Area	Total Housing Units	Total Occupied Housing Units	Total Vacant Housing Units
Minnesota	2,574, 932	2,344,432	230,500
Lyon County	11,252	10,003	1,249
Custer Township	96	86	10
City of Garvin	43	42	1

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

[160] Minnesota Department of Transportation. *Rail Viewer Application (MnRail)*. [Online] [Cited: January 9,2025]. Retrieved from: https://www.arcgis.com/apps/webappviewer/index.html?id=5640f575a86148039704660c29126f24&extent=-11690507.5359%2C5234420.4958%2C-9081864.6346%2C6507555.6389%2C102100

[161] Lucinda Johnson, Will Bartsch, George Hudak, Mae Davenport, Kris Johnson, Kristi Nixon, Jane Reed, and Atlas Team. 2002. Minnesota Natural Resource Atlas: Online mapping tools and data for natural resource planning, management, and research in Minnesota. Natural Resources Research Institute, University of Minnesota Duluth.

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

Coneflower Solar does not anticipate impacts to water and wastewater systems, as there are no wells located within the land control area. Additionally, the nearest occupied residence is at least 240.2 feet from project facilities, minimizing the risk of impacts to any unmapped private wells in the area. A single domestic-sized water well will likely be required in the O&M building to provide potable water for drinking and sanitary services for three full time operation employees. If a domestic water well is needed, 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 150-200 employee vehicles on site per day during active construction (18 months). Approximately 10 – 20 truck trips/per day will be used during site preparation and solar panel installation, and 15-20 truck trips/per day will be used during the peak equipment delivery period.

Construction traffic will be perceptible to area residents, particularly those residing within and around the city of Garvin, as the traffic volume on the surrounding county and township roads is relatively low. However, because the average daily traffic within the area is well below the design capacity of a rural two-lane highway,[162] 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. These delays should be minimal for the relatively short construction delivery period.

Coneflower Solar will construct signage on local roads to direct deliveries to the appropriate location and information the general public about construction traffic. Overweight or oversized loads are not anticipated, but if required, appropriate approvals will be obtained as necessary.[163] Coneflower Solar will minimize the movement of construction equipment on or across roads and conduct all movement in accordance with MnDOT requirements.

Coneflower Solar will construct facilities within the limits of the preliminary development area. Coneflower Solar will closely coordinate construction activities with city, county, and township staff if any closures are determined necessary. With the possible exception of minor field access or driveway changes depending on final design, no changes to existing roadways

[162] Polus, Abishai, Craus, Joseph and Livneh, Moshe. *Flow and Capacity Characteristics on Two-Lane Rural Highways*, retrieved from: onlinepubs.trb.org/Onlinepubs/trr/1991/1320/1320-016.pdf

[163] SPA, pp. 7-9, Table 2.5-1: Potential Permits and Approvals for the Coneflower Solar Project.

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

The close proximity of some of the proposed stormwater basins to the US 14 ROW could increase drainage into the ROW. Any changes in peak runoff rates to the ROW could negatively impact the existing land and infrastructure surrounding the project, such as culvert systems.[164]

The use of US 14 to access the project has additional public safety impacts which are discussed, along with mitigations, in Section 4.4.2.

Railroads

No impacts to railroads are anticipated as there are no railroads within the land control area.

Electric Utilities

No long-term impacts to utilities will occur because of the project. The project will not impact existing overhead transmission lines or substations.

Pipelines

Coneflower Solar has designed the project so that all facilities have a 25-foot setback from the existing pipeline corridor running southeast-northwest through the project to avoid potential impacts.[165] Accurate location of the pipeline is necessary to properly apply setbacks.

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.

Housing

The project will bring an influx of temporary workers to the area during the construction phase. These temporary workers will require housing for the duration of the construction phase. There is limited available housing in the project area; if vacant housing units are utilized for temporary workers, this may lead to a local housing shortage. Individuals looking to move to the area may find limited options for available housing.

MITIGATION

Water and Wastewater

Coneflower 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

[164] MNDOT, Scoping Comments, December 4th, 2024, eDockets number: 202412-212702-01.
[165] SPA, p. 23.

permit from the Minnesota Department of Health (MDH) would be required if a well is installed at the O&M building.

Utilities

Section 4.3.5 of the DSP (**Appendix B**) 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. Additionally, Coneflower Solar indicates they will conduct an American Land Title Association Survey to identify the locations of any underground utilities within the project.[166] 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 coordination with local authorities and permits from Lyon 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.

Review and modeling of stormwater pond placement can determine the potential drainage effects of locating stormwater ponds in proximity to the US 14 ROW. Section 5.3 of the DSP is a special condition requiring the permittee to coordinate with a MnDOT District Hydraulics Engineer for a review of the project to determine if a drainage permit is required.

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

[166] SPA, p. 61.

Section 5.4 of the DSP is a special condition requiring the permittee to coordinate with Northern Border Pipeline Company to determine the location of Northern Border's existing pipeline within the project area and to avoid potential impacts to this pipeline.

Railroads

No active railroads are within the project area; therefore, no mitigation is required.

Air Safety

The current project plan generated a "no notice required" from the FAA's Notice Criteria Tool for all components of the project; therefore, no mitigation is required.

Housing

Coneflower Solar is aware of the limited housing availability in the project area. They have indicated that temporary construction workers will likely be housed in nearby hotels and vacant housing in the City of Marshal, rather than local vacant housing units. This will maintain housing availability for other individuals who may relocate to the area. No impacts to local housing availability are anticipated, therefore no mitigation is required.[167]

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.

Lyon County is growing slower than Minnesota as a whole; between 2010 and 2020, the population in Lyon County decreased by 2.2 percent, compared to a growth of 7.6 percent for Minnesota overall. From 2010 to 2020 the population of Custer Township decreased by 13.7 percent, and the population of the city of Garvin decreased by 8.14 percent. Lyon County, Custer Township, and the city of Garvin all have a lower minority population compared to the State. Additionally, Lyon County, Custer Township, and the city of Garvin have lower median household incomes compared to the State, although the median income in Custer Township is only slight lower than the State's (Table 20).

Lyon County is part of the Minnesota Department of Economic Development (MDEED) Region 8, which is located in the Southwest Planning Region. In 2023, the industries with the largest employment in Lyon County were educational services, healthcare, and social assistance (24.7 percent), manufacturing (12.9 percent) and retail trade (11.1 percent).[168] In 2023, Lyon County had a marginally lower unemployment rate (2.5%) than the state average (2.8%). The county had a slightly

[167] SPA, p. 70.
[168] American Community Survey, 2023

lower labor force participation rate (67.1%) than Minnesota as a whole (68.7%) and is projected to see a continued labor force decline from 2025 to 2035.[169]

Table 20. Population Characteristics

Area	Total Population				Population Characteristics		
	2010 Census*	2020 Census*	% Change 2010 - 2020	2023 Estimate **	% Minority‡	Median Household Income ($)º	% Below Poverty Levelº
Minnesota	5,303,925	5,706,494	+7.6	5,800,386	23.3º	85,086	9.3
Lyon County	25,857	25,269	-2.2	25,427	16.5º	72,761	12.5
Custer Township	203	175	-13.7	167	4.1º	81,250	9.3
City of Garvin	135	124	-8.14	124	7.8°	41,000	23.3

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

** 2023, Minnesota State Demographic Center, Population Data, Our Estimates, https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/

° 2020 American Community Survey 5-year estimates

º 2023 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 populations (see discussion of environmental justice in Section 4.3.9). 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 throughout the community by investing in local business expenditures as well as state and local taxes.

Employment and Wages

[169] Minnesota Department of Economic Employment and Development (DEED). *Economic Development Region Profile, Lyon County 2023 Regional Profile*. (2023), https://mn.gov/deed/assets/012725_lyon_tcm1045-407663.pdf

The applicant anticipates supporting up to 300 temporary construction and installation jobs for this project and following the prevailing wage[170] 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.[171]

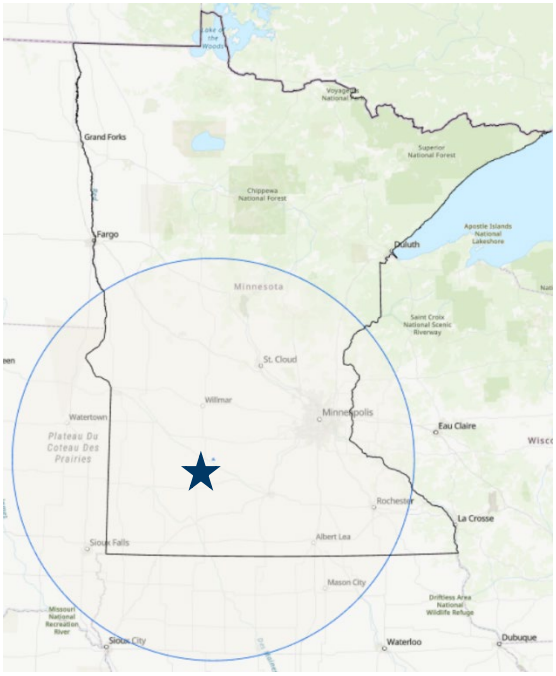
The applicant anticipates the project will require up to 200 laborers during the construction and installation phases, and 2-3 long-term personnel during the operations phase. Coneflower Solar indicates they will prioritize construction contractor and supplier bids that utilize local, union construction employees to the greatest extent feasible, and expects the selected contractor to work with unions and stakeholders to create a workforce and hiring plan that will maximize local economic benefits. Coneflower Solar notes that it may be necessary to import specialized labor from non-local areas in Minnesota or other states, as the short duration of the construction phase precludes special training of local labor.[172]

Minnesota's Renewable Energy Objectives[173] and Renewable Energy Initiatives[174] establish several Commission priorities relating to renewable energy project construction including:

- Creation of jobs that support Minnesota families
- Employing local workers for project construction
- Recognition of the rights of workers to organize and unionize

The location of the proposed project gives Coneflower Solar the potential to meet Commission priorities by providing significant socioeconomic benefits to local, union construction workers. "Local workers" are defined as Minnesota residents and/or permanent residents who live within 150 miles of a proposed energy facility.[175] Figure 26 presents a 150 mile "local

Figure 26. Project "Local Worker" Radius



[170] EA, Appendix C, Question 11.
[171] U.S. Department of Labor, *Prevailing Wage and the Inflation Reduction Act*. https://www.dol.gov/agencies/whd/IRA
[172] SPA, p. 70.
[173] Minnesota Statute 216B.1691, Subd. 9.
[174] Minnesota Statute 216B.2422.
[175] Minnesota Statute 216B.2422, Subd. 1.

worker" radius from the proposed project location, which would be accessible to workers living in Western, Central, and Southern Minnesota. Project construction will result in indirect, local economic benefits from additional spending on lodging, goods and services and local sales tax.[176] These benefits are anticipated to be greater if the construction workforce is largely composed of local labor versus non-local labor. Local workers are found to generate approximately three times more local economic activity through spending than a non-local worker at the individual level,[177,178] and a largely local workforce generates double the economic impact of a largely non-local workforce.[179]

The use of local workers who reside in Lyon County could have significant positive impacts, not just through providing employment on this project, but by providing workers the opportunity to develop the required technical skills to work in the green economy,[180] which can increase opportunities for future employment. Minnesota is anticipated to continue to expand renewable energy development in the coming years,[181] and the state's investments in the development and incentivization of clean energy[182] will enable future renewable projects. Coneflower Solar's use of local labor would provide Minnesota workers with the relevant skills for the growing renewable industry, preparing them for future employment opportunities.

Taxes

Once the project is operational, Coneflower 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.[183]

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[176] SPA, p. 70.

[177] Franco, L. 2020 *A Transformative Investment: Maximizing the Socioeconomic Benefits of the Fargo-Moorhead Diversion Project.* Retrieved from: https://d3ciwvs59ifrt8.cloudfront.net/272d7204-1f87-45d8-a9dc-744c9333acc6/e6f95bb7-5559-4dd9-a0bd-21c636c5b778.pdf

[178] Franco, L. 2019. *Catching the Wind 3.0: The impact of local versus non-local hiring practices on wind farms in North Dakota.* Retrieved from: https://ndlegis.gov/assembly/67-2021/testimony/SNATRES-2301-20210204-5243-F-FRANCO_LUCAS_A.pdf

[179] Franco, L. 2020. *Maximizing The Benefits of Wind Energy Development Through Local Construction Hiring: The Northern Divide Wind Energy Project Case Study.*

[180] Grima, S., Sood, K., Özen, E., & Dalli Gonzí, R.E. (Eds.). (2025). *Greening our economy for a sustainable future*, retrieved from: https://www.sciencedirect.com/book/9780443236037/greening-our-economy-for-a-sustainable-future

[181] 2024 Minnesota Energy Factsheet, retrieved from: https://www.cleanenergyeconomymn.org/wp-content/uploads/2024/04/2024-Minnesota-Energy-Factsheet.pdf

[182] H.F. 5247

[183] 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 .

Minnesota has adopted a production tax of $1.20/MWh paid 80 percent to counties and 20 percent to the cities and townships.[184] Coneflower Solar estimates average annual solar energy production and property tax revenue of approximately $477,225 for Lyon County and approximately $119,306 for Custer Township.[185]

Agricultural Businesses

If the project is constructed, approximately 1,723.2 acres will be removed from agricultural production that are currently used to produce corn and soybeans. Adverse impacts associated with the loss of agricultural land and agricultural production will be mitigated through lease payments to landowners. However, landowners are not the only group who may experience adverse impacts due to the loss of agricultural activity associated with the land conversion. There are a variety of occupations that depend upon all stages of agricultural production for income. This includes individuals engaged in the sale of agricultural products, such as seed and fertilizer dealers, the provision of agricultural services, such as animal waste applicators and bulk milk haulers, or the purchase and use of agricultural products, such as grain buyers and meat packing companies. Individuals employed in these agricultural-related businesses and occupations do not receive lease payments, as they do not own the participating land, and the removal of cultivated land may result in an incremental impact to agricultural-related businesses in the area.

The MDA oversees the licensing and permitting of agricultural-related businesses and operations throughout the State. The primary crops grown within the land control area are corn and soybeans, which are associated with agricultural-related businesses relating to seed sales, pest control, applications related to soil health and yield, and the purchase and manufacturing of crop products. The licenses and permits relevant for these occupations are indicated in Table 21.

There are no businesses within the city of Garvin that have an active MDA license or permit for materials or services relevant to soybean or corn production. The

Table 21. Agricultural Businesses within Lyon County[186]

Permit/License Type	Number
Agricultural Liming	2
Anhydrous Ammonia Storage	2
Bulk Pesticide/Fertilizer Storage	13
Buy & Store Grain	3
Commercial Animal Waste Technician	1
Commercial Feed	12
Fertilizer License	14
Grain Buyer	4
Pesticide Dealer	11
Structural Pest Control	1
Whole Food Handler	9
Wholesale Food Producer/Manufacturer	7
Total	**79**

[184] *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

[185] SPA, p. 71

[186] Minnesota Department of Agriculture, *Licensing Information Search*, [cited March 4, 2025], https://www2.mda.state.mn.us/webapp/lis/default.jsp

relevant agricultural-related businesses closest to the project can be found in Balaton and Tracy.

The extent of any decrease in agricultural sales or demand for agricultural services as a result of the project's construction and operation is difficult to determine. However, the conversion of approximately 1,723.2 acres of farmland, which represents 0.9 and 1.0 percent of the county acreage dedicated to growing corn and soybeans, respectively, would ultimately constitute a removal of approximately 0.4 percent of the 424,591 acres of farmland in Lyon County.[187] Additionally, only 79 individuals, approximately 0.3 percent of Lyon County's population, currently hold active MDA licenses or permits relevant to soybean or corn production. The removal of this small proportion of the county's agricultural production is unlikely to have a significant impact on the small number of licensed or permitted individuals in the county.

Financial Assurances

Section 9.1 of the DSP makes the project owner financially responsible for decommissioning the project and its facilities. Coneflower Solar anticipates providing financial assurance for decommissioning in the form of an escrow account or surety bond that equals the costs to ensure the project is properly decommissioned. The financial assurance will be posted no earlier than the 10th anniversary from the project's commercial operation date. From that point, a revised decommissioning estimate will be submitted every five years or upon change of ownership. The revised plans will reflect any new advancements in the techniques, reclamation equipment, and standards related to decommissioning. The revised plans will also include a reassessed and revised decommissioning cost estimate that will reflect any changes in the costs, include the salvage values of materials and equipment. The amount of financial surety will be adjusted in accordance with revised cost estimates to offset any increases or decreases in the project's decommissioning cost and the salvage values of materials and equipment.[188]

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 8.6 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.

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.

[187] USDA, Census of Agriculture County Profile, Lyon County Minnesota (2022). https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27083.pdf.

[188] SPA, Appendix F: Decommissioning Plan.

Environmental justice ensures that all people, regardless of race, color, national origin, or income, experience equal benefits from environmental protections, and receive equal opportunities to participate in the decisions related to the development, implementation, and enforcement of environmental regulations and policies that may impact their environment or health. The goal of environmental justice is not to shift risks among populations, but to identify populations that have experienced disproportionately high exposure to, and adverse effects from, environmental hazards, and determine how these impacts can be mitigated.[189]

Potential Impacts

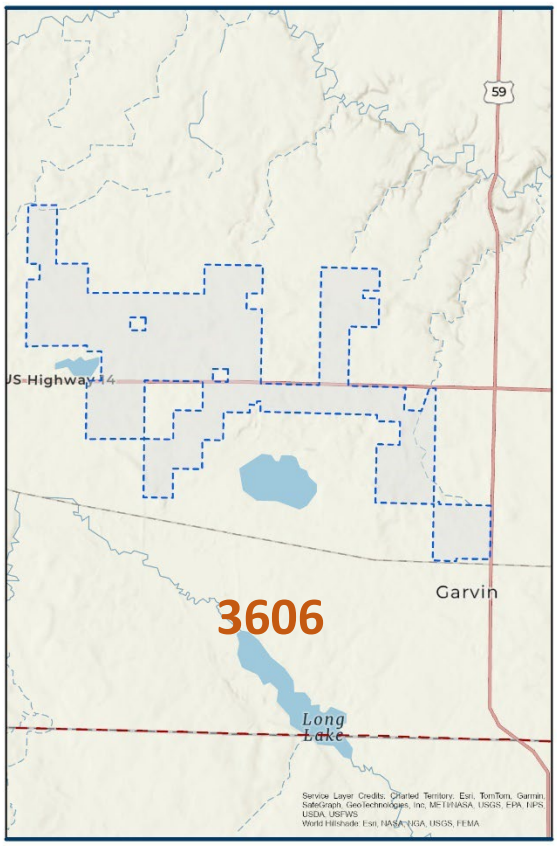
Utility infrastructure can adversely impact low-income, minority or tribal populations. Minnesota Statute 216B.1691, subd. 1 (e)[190] defines an environmental justice area as a census tract that contains:

1) 40 percent or more minority populations
2) 35 percent or more households with income ≤ 200 percent of the poverty level
3) 40 percent or more residents with limited English proficiency, or;
4) Indian country.

The ROI for this analysis includes the census tracts intersected by the project, as they offer the best approximation of the geographic area within which potential disproportionate impacts from the project could occur. Lyon County, which contains this census tract, is considered representative of the general population in the project area against which census tract poverty and demographic data can be compared. The city of Garvin was also included, as it is directly adjacent to the project.

To identify potential environmental justice concerns in the project area, the MPCA's EJ Mapping 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. There are only two areas of EJ concern in Lyon County, the City of Marshall, 12 miles north of the project, and the City of Tracy, six

Figure 27. Census Tracts in Project Area*



*Entire project is located within Census Tract 3606

[189] Minnesota Department of Health. (2021). *Environmental Justice*, retrieved from: https://data.web.health.state.mn.us/environmental_justice

[190] Minnesota Statute 216B.1691, subd. 1 (e).

miles east of the project. In both these areas, the household income at or below 200 percent of the federal poverty level is above 35 percent.[191]

Staff conducted a demographic assessment of the affected community to identify low-income and minority populations using U.S. Census data. 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. Table 22 provides low-income and minority population data and Figure 27 shows the census tract used to compare the project area with Lyon County. The proposed project is not within the exterior boundaries of a federally recognized tribal reservation or community.

Table 22. Low-Income and Minority Population Characteristics

Area	% Income ≤ 200% of Poverty Level	% limited English proficiency	% Minority Population‡
Area			
Minnesota	22.0	2.3	23.3
Lyon County	31.7	2.7	17.2
City of Garvin	(x)	0.0	15.4
Project Census Tract			
Census Tract 3606	23.7	0.0	4.1

Source: U.S. Census Bureau, 2023 American Community Survey5-year Estimate

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

(x) There was insufficient data to calculate poverty rate in the city of Garvin

None of the percentages for census tract 3606 exceed 50 percent of the Lyon County percentage by 10 percentage points or more, which is the defined threshold of significance for potential environmental justice impacts from the project.

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 Lyon County, the region of comparison. Additional mitigation is not proposed.

[191] MPCA EJ Mapping Tool, https://experience.arcgis.com/experience/bff19459422443d0816b632be0c25228/page/Page/?views=EJ-areas..

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 Electric and Magnetic Fields

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

Electric and magnetic fields (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 23 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."[192]

[192] 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

Table 23. Electric and Magnetic Field Strength of Common Household Objects[193]

Electric Field*		Magnetic Field**			
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."[194]

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.[195] Nevertheless, they are fields of energy and thus have the potential to produce effects.

[193] 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

[194] 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

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

> "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."[196]

> "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."[197]

> "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."[198]

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.[199]"

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-

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

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

[198] 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.

[199] Id., page 36.

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.[200] Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (Table 24).

Table 24. International Electric and Magnetic Field Guidelines

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

The Commission limits the maximum electric field under high voltage transmission lines in Minnesota to 8.0 kV/m.[201] It has not adopted a standard for magnetic fields.

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. If Coneflower Solar decides to proceed with the Garvin Scenario, the EMF specific to the 345 kV gen-tie line that will connect the project to the proposed Garvin Substation will be analyzed in the environment review for that route permit.

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.[202] For electrical collection lines, a study found that at 27.5

[200] 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.

[201] *E.g.*, Department of Commerce (May 14, 2018). *Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project,* retrieved from: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/34748/1%20Text%20Figures%20Tables.pdf,

[202] 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

kV that magnetic fields are within background levels at 1 meter above ground.[203] The project's MISO Scenario includes a 115 kV overhead gen-tie line; underneath a 115 kV overhead transmission line, the typical electric field levels are 1.0 kV/m, which dissipates to 0.5 kV/m at 50 feet, and the typical magnetic field levels are 29.7 mG, before dissipating to 6.5 mG at 50 feet.[204]

Coneflower Solar states that the underground power cables that make up the collection system will be shielded. Shielded cables have the energizing conductor located in the center of the power cable and surrounded by a grounded metallic shield.[205] The shielding design confines the electric field to the interior of the power cable and neither the cables nor any other collection system components produce a detectable electric field. Additionally, the transformers will be shielded via enclosure in a grounded metal case.[206]

MITIGATION

No health impacts from EMF are anticipated. EMF diminishes with distance from a conductor or inverter. The nearest solar array is located approximately 323 feet from the nearest residence and 677 feet from the nearest collection line and inverter/transformer.[207] 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. Additional public risks include construction-related impacts reducing motorist safety on state highways. Potential impacts during construction are anticipated to be **minimal**. Potential impacts during operation 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. During operation there are occupational risks similar to those associated with construction. Public risks would result from unauthorized entry into the facility.

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

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[203] McCallum L.C., Whitefield Aslund M.L., Knopper L.D., Ferguson G.M., & Ollson C.A. (2014). *Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern?* DOI: 10.1186/1476-069X-13-9

[204] National Institute of Health. June 2002. *Electric and Magnetic Fields Associated with the Use of Electric Power: Questions & Answers*. Retrieved from: https://www.niehs.nih.gov/sites/default/files/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

[205] Kelly, L. J. & Landinger, C. C. (1999). *Electrical Power Cable Engineering, Chapter 9: Standards and Specifications*. Retrieved from: https://studylib.net/doc/8676369/electrical-power-cable-engineering

[206] SPA, p. 53.

[207] Id.

orientation and training, as well as daily/weekly safety meetings. 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. Fencing will deter public access, and signage will provide appropriate public warnings.

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 Lyon County Sheriff and the City of Tracy and Tyler police departments. Fire service is provided by city, community, and volunteer fire departments within 15 miles of the project located in Garvin, Lynd, Tyler, and Walnut Grove. Ambulance response is provided by both regional and local ambulance services, including the Balaton Fire Department Ambulance Service for Lyon County and the cities of Tracy and Tyler. The nearest hospitals to the project are Avera Marshall Regional Medical Center (Lyon County) and the Murray County Medical Center in Slayton (Murray County). The Sanford Health Medical Center in Tracy and Average Medical Group in Tyler are smaller medical centers within the 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.

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.[208]

Several specific public safety concerns are individually addressed below.

Fire Risk and Emergency Services

Like any electrical system, solar panels do represent a potential fire risk. Research on fire risk in PV systems indicates that electrical arcing is a main cause of fires, arising due to the use of faulty products, installation errors, or irregular maintenance failing to identify issues with system components.[209] Thus far, research investigating the causes of fire in PV systems has mainly focused

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

[209] Ong, N., Sadiq, M., Said, M., Jomaas, G., Tohir, M., & Kristensen, J. (2022). *Fault tree analysis of fires on rooftops with photovoltaic systems.* DOI: https://doi.org/10.1016/j.jobe.2021.103752

on rooftop installations; considering that ground-mounted PV systems contain similar electrical components as rooftop systems, they likely experience similar fire causes as well.

The preliminary development area will contain native vegetation, which could increase the fire hazard if improperly managed. Due to the proximity of the project to the city of Garvin, an uncontrolled fire within the site could become a threat to public safety. The Garvin volunteer fire department would be the initial responder to fires on site, as a small-town volunteer fire department they may lack experience managing fires in large-scale electrical utilities.

Law enforcement, fire services, and ambulances may need to enter the site in an emergency. If site access or maneuverability is hindered, this may delay their response time.

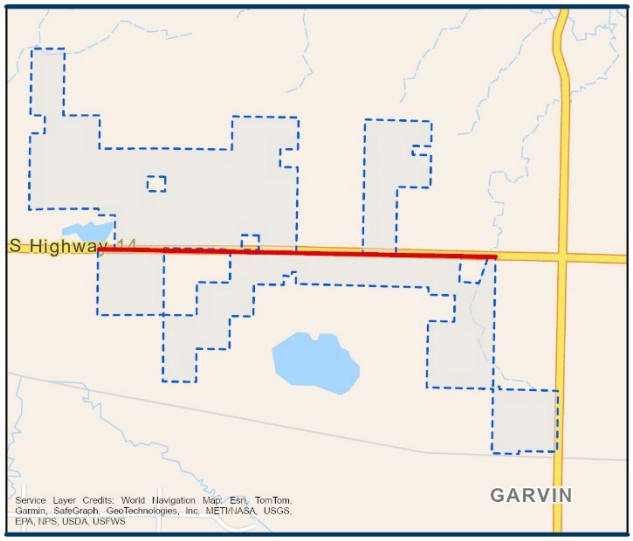
US 14: Access Points

Coneflower Solar currently plans to install five project access points on US 14 for the central portion of the site. The addition of these new access roads on US 14 poses a human safety concern.[210] MNDOT has identified access management a legitimate public safety issue, noting that there is a direct connection between vehicle crash rates and access point density on state trunk highways.[211] The access points along US 14 would see a significant volume of project-related traffic, some of which will be oversized and/or slow-moving loads. This segment of road experiences high-speed traffic and increasing the number of access points along this stretch could create a significant collision risk.

High Severity Ranked Snow Trap

The project's proposed boundary is located on a high severity ranked snow trap that runs along US 14 through the center of the project (Figure 28). The proximity of the project solar panels to the snow trap could result in a dangerous buildup of snow drifts close to the road. Snow drifts could create a significant blowing snow concern, leading to reductions in visibility and increased potential for collisions or accidents.[212] In addition, snow buildup adjacent to the road would require MnDOT to increase their mechanical snow removal operation efforts during winter.

Figure 28. High Severity Snow Trap



Heat Island

As solar facilities are increasingly installed in the landscape, there are concerns that panels create a heat island effect that may impact human

[210] MNDOT, Scoping Comments, December 4th, 2024, eDockets number: 202412-212702-01.
[211] MNDOT. *Statistical Relationship Between Vehicular Crashes and Highway Access*. August 1998. Retrieved from: https://dot.state.mn.us/accessmanagement/docs/pdf/research/statisticalrelationships.pdf.
[212] Id.

health. Although dark solar panels can result in solar fields exhibiting temperatures a few degrees above the ambient temperature and both the modules and wires can radiate some heat from electrical current, any heat generated by the solar facility would be at inconsequential levels to the surrounding environment.[213] Impacts to human health from heat emitted by the project are not anticipated.

MITIGATION

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. Coneflower 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.

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

- Section 4.3.30 requires the permittee to take several public safety measures, including landowner educational materials, appropriate signs and gates, etc.
- 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.

Additional mitigation in relation to the specific public safety concerns raised are discussed below.

Fire Risk and Emergency Services

Appropriate PV system installation can reduce fire risk resulting from inaccurate construction methods, and proactive maintenance and monitoring of electrical equipment can identify risky system components before a fire occurs. 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. Data streams from the SCADA equipment will be remotely monitored 24/7, allowing for constant monitoring of, and communication with, the project and relaying of alarms and communication errors.[214] Compliant system installation along with continual monitoring and a proactive approach to maintenance tasks will reduce fire risk within the site.

[213] EA, Appendix C, Question 15.
[214] SPA, p. 30.

Coneflower Solar's VMP[215] provides additional fire risk mitigation. Site vegetation will be controlled via mowing and/or grazing, preventing the accumulation of biomass and reducing fire hazard. The use of rotating PV arrays alongside vegetation removal techniques such as grazing can reduce fire hazards.[216]

Section 8.12 of the DSP requires the permittee to prepare an Emergency Response Plan in coordination with local emergency responders. Section 5.5 of the DSP is a special condition that requires the permittee to develop and incorporate a Project Fire Risk Assessment into the Emergency Response Plan required under Section 8.12 of the permit.

US 14: Access Points

Coneflower Solar indicates they have complied with MnDOT's request[217] to utilize existing roads off US 14 for project access rather than installing new roads that increase access density and associated crash risk. Coneflower Solar will combine or shift all five proposed new access points to utilize existing roads and field entrances to access the project. No new access roads will be required off US 14.[218] The use of existing access roads to access the project would be a "change of use" and will require permit approval from MnDOT. The increased construction traffic using the existing access roads, some of which could include slow-moving or oversized loads, may still pose a collision risk along US 14. Any risks related to project access off US 14 will be mitigated though special provisions and instructions included in MnDOT access permits.

High Severity Ranked Snow Trap and Living Snow Fence

To reduce the risk of a dangerous snow drift buildup between the solar panels and US 14, offsets between project solar panels and the US 14 ROW are required. Compliance with these offsets will reduce the potential for dangerous blowing snow conditions that reduce visibility and increase collision risk along this stretch of US 14. Additionally, incorporating solar panel offsets into the project design will add the value of reducing MnDOT's mechanical snow removal operation efforts during the busy winter season. Section 5.6 of the DSP is a special condition that requires the permittee to incorporate the MnDOT Blowing Snow Control Team's recommended solar panel offsets into their final design to prevent snow drifts from blocking US 14 adjacent to the project.

No additional mitigation is proposed.

4.5 Land-based Economies

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

[215] SPA, Appendix E: Vegetation Management Plan.

[216] Vaverková, M., Winkler, J., Uldrijan, D., Ogrodnik, P., Vespalcová, T., Aleksiejuk-Gawron, J., Adamcová, D., & Koda, E. July 2022. *Fire hazard associated with different types of photovoltaic power plants; Effect of vegetation management.* DOI: https://doi.org/10.1016/j.rser.2022.112491

[217] MNDOT, Scoping Comments, December 4th, 2024, eDockets number: 202412-212702-01.

[218] EA, Appendix C, Question 4.

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 Lyon County would occur for the life of the project. Potential impacts are localized and unavoidable but can be minimized.

Agricultural use dominates approximately 95 percent (2,299.4 acres) of the land control area, with corn and soybeans as the dominant crops. Agricultural characteristics for Lyon County are summarized in Table 25.

Table 25. Agricultural Characteristics – Lyon County[219]

Category	2022	Percent change from 2017
Acres of farmland	424,591	+7
Number of Individual farms	869	-3
Average farm size (acres)	489	+10
Average value of agricultural production	$877,935	+90
Top crops (in acres)	Corn and soybeans	NA
Largest livestock inventory	Hogs and pigs, turkeys	NA

Crops comprise slightly less than half of the market value of agricultural production in Lyon County (approximately 41 percent), with the remainder from livestock, poultry, and products. In terms of acreage, corn and soybeans dominate the landscape, though Lyon County also has thousands of acres of forage (hay and haylage) and wheat for grain. Turkeys comprise the largest portion of livestock revenues, followed by hogs and pigs.

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 82.7 percent of the land within Lyon County is considered prime farmland.[220] Nearly all the solar facility land control area is classified as prime farmland or prime farmland if drained (Table 26). With respect to prime farmland, the applicant indicates that no feasible or prudent alternatives to the project exist.

[219] USDA, 2022 Census of Agriculture, County Profile: Lyon County, Minnesota. Retrieved from: https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27083.pdf.

[220] SPA, Appendix D: Agricultural Impact Mitigation Plan.

Table 26. Prime Farmland within Solar Facility[221]

Farmland Classification	MISO Scenario		Garvin Scenario	
Preliminary Development Area	**Acres**	**% of Site**	**Acres**	**% of Site**
Prime Farmland	1,110.5	50.5	1,110.4	48.3
Prime Farmland if Drained	359.3	16.3	359.3	15.6
Prime Farmland if Protected from Flooding	0	0.0	0	0.0
Farmland of Statewide Importance	205.3	9.3	205.3	8.9
Not Prime Farmland	0	0.0	48.2	2.1
Total	**1,675.1**	**76.1**	**1,723.2**	**74.9**

Over the past century, many farmers in the area have installed subsurface drainage systems to enhance crop yield. These systems use perforated pipe placed at a slope to move excess water from the crop root zone to a ditch or other outlet. Most drainage pipe used today is plastic, but because concrete or clay pipes were used historically, terms such as tile or tiling or drain tile are still used. Tiling can enhance crop productivity by lowering the water table, improving soil aeration, and allowing the soil to warm and dry more quickly in the spring.[222]

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 1,723.2 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 0.4 percent of existing agricultural land in Lyon County. The applicant indicates that the land could be returned to agricultural uses after the project is decommissioned and the site is restored. The remaining 576 acres are within the land control area but outside the preliminary development area and will not host any components of the solar facility. Agricultural

[221] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[222] University of Minnesota Extension. *Impact of Agricultural Drainage in Minnesota.* (2018). Retrieved from: https://extension.umn.edu/agricultural-drainage/impact-agricultural-drainage-minnesota#sources-1360510.

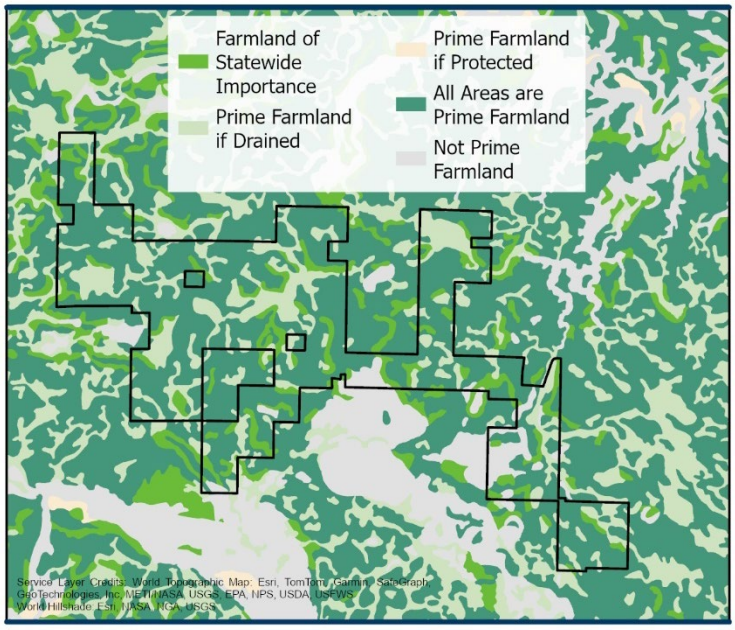
production would be allowed to continue on these 576 acres during the construction and operation of the project.

Soil Compaction and Erosion

Construction of the project has the potential to damage agricultural soils through compaction or erosion if BMPs are not implemented to minimize damage. Soil compaction could occur during the construction phase due to the heavy axle loads and tire contact pressure from equipment used to install project components. Compaction reduces soil pore size, resulting in reduced water infiltration, internal drainage, and holding capacity. The increased water retainment in compacted soils delays warming in the spring, which can result in late and uneven emergence of crops. Crops grown in compacted soils, which are difficult to penetrate, develop restricted root systems, limiting their nutrient uptake ability. The consequences of these compaction-induced effects on crop development can result in nutrient-deficient crops with poor growth, leading to overall reductions in yield.[223]

Soil erosion could result from the ground-disturbing and grading activities necessary during the construction phase. Erosion could be heightened during wet or windy conditions. Topsoil, considered the most productive soil layer, is rich in nutrients and organic matter. Declines in topsoil nutrients and thickness resulting from erosion can cause significant reductions in crop yield[224] and require supplementation with fertilizers and agricultural treatments, increasing production costs. Subsoil, while less productive than topsoil, contains important stores of water and nutrients that are essential for high yields, particularly in areas with nutrient-depleted topsoil.[225]

Figure 29. Prime Farmland in Project Area



Prime Farmland

In Minnesota, no large electric power generating site may be permitted where the developed portion of the plant site includes more than 0.5 acres of prime farmland per megawatt of net

[223] DeJong-Hughes, J. & Daigh, A. (2022). *Upper Midwest Soil Compaction Guide*, retrieved from: https://conservancy.umn.edu/items/c1345055-559e-4c51-95a4-c8f869f5a49e

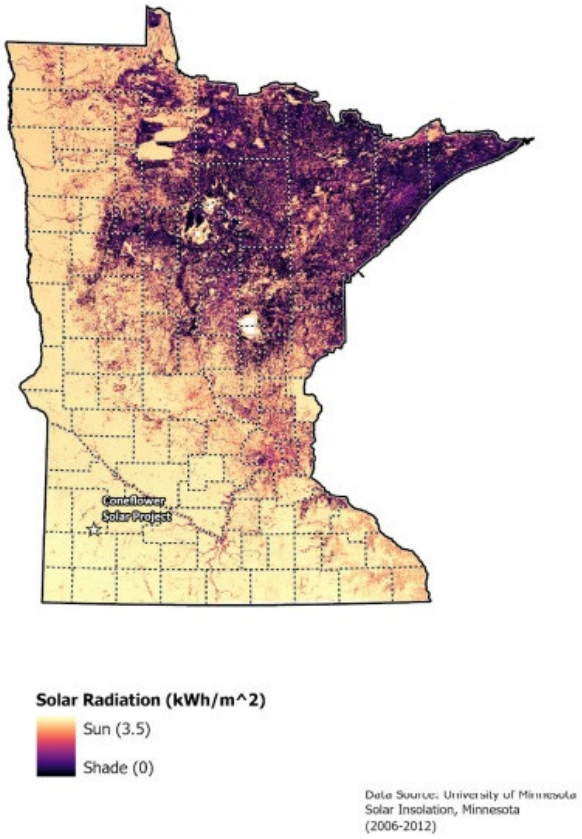
[224] Zhang, L., Huang, Y., Rong, L., Duan, X., Zhang, R., Li, Y., & Guan, J. (2021). *Effect of soil erosion depth on crop yield based on topsoil removal method: A meta-analysis*. DOI: https://doi.org/10.1007/s13593-021-00718-8

[225] Ning, T., Liu, Z., Hu, H., Li, G. & Kuzyakov, Y. (2022). *Physical, chemical, and biological subsoiling for sustainable agriculture.* DOI: https://doi.org/10.1016/j.still.2022.105490.

generating capacity, unless there is no feasible and prudent alternative.[226] With a generating capacity of up to 235 MW, the project, by rule, should impact no more than 117.5 acres of prime farmland. This is substantially less than the actual acreage of prime farmland affected, which is conservatively estimated to be 1,469.8 acres of prime farmland (Figure 29, Table 26).[227]

Coneflower Solar conducted a site selection analysis to inform their project location choice.[228] The first siting factor considered was the level of horizontal solar irradiance in a region; the high levels present in southwestern Minnesota led them to focus on this region of the state (Figure 30[229]). Coneflower Solar analyzed the southwestern portion of the state to identify both existing and future transmission lines and substations with available capacity equal to the project, at least 235 MW. Two points of interconnection (POIs) were identified that had the available capacity and relatively low interconnection costs, the existing Lyon County to Lake Yankton 115 kV transmission line (MISO Scenario) and the proposed Garvin Substation associated with the MNEC project (Garvin Scenario). Coneflower Solar then screened available land within a five-mile radius of the identified POIs to identify suitable sites. Five miles was established as the upper limit of transmission length that a solar project of this size could support due to the financial limitations of constructing a longer transmission line such as construction costs, easement acquisition costs, and electrical losses.

Figure 30. Minnesota Solar Irradiance



Coneflower Solar determined land within the five-mile radius of each POI to be potentially suitable if it was cleared and undeveloped, not hindered by other easements, and contained minimal obstacles, such as water bodies and infrastructure, that would limit the amount of available land or require irregularly shaped development areas. Additionally, Coneflower

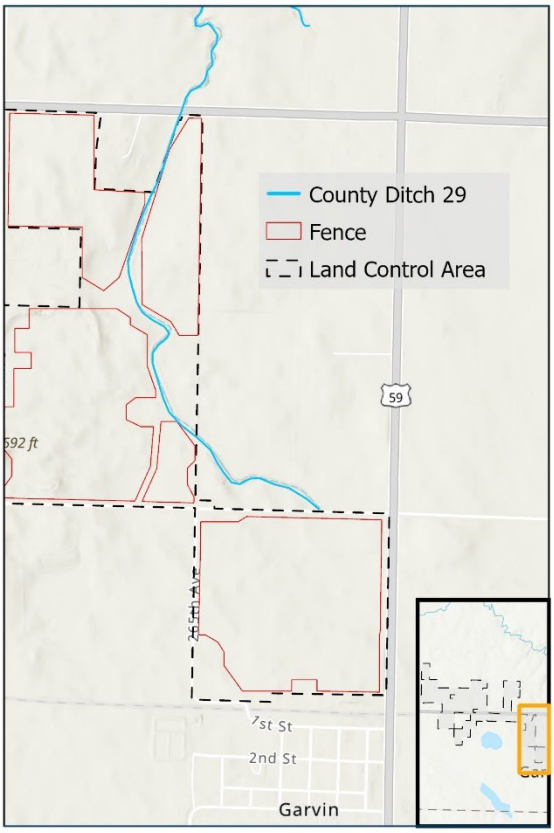
[226] Minnesota Rule 7850.4440.
[227] This is based on the project boundaries, not the preliminary development area, thus contains more land than will be constructed on. However, Coneflower Solar will have site control over all land within the project boundary.
[228] SPA, pp. 11-16.
[229] Brink, C., Gosack, B., Kne, L., Luo, Y., Martin, C., McDonald, M., Moore, M., Munsch, A., Palka, St., Piernot, D., Thiede, D., Xie, Y., & Walz, A. (2015). Solar Insolation, Minnesota (2006-2012). Retrieved from the Data Repository for the University of Minnesota (DRUM), http://dx.doi.org/10.13020/D6X59X

Solar screened potential land for geotechnical risks, endangered species habitat, culturally sensitive areas, and potential environmental risks including pollutants, flood zones, and land use conflict. Once potential areas passed the screening tests, Coneflower Solar approached landowners to negotiate voluntary leases and easements. The proposed location was ultimately chosen as it is in close proximity to each POI, passes the screening constraints, has supportive landowners, and is not participating in other renewable energy projects.

Ditches and Drain Tile

Drain tile is an important agricultural practice in the Midwest. Drain tile can be particularly useful to improve crop productivity of poorly drained soils.[230] Soil classified as "Prime farmland if drained" makes up approximately one-quarter of the land control area (Table 26) and a significant amount of the neighboring properties (Figure 29). Private drain tile is present throughout the land control area, as is one Lyon County public ditch which provide important drainage services for the surrounding landowners. Damaged or blocked tile lines can impede soil drainage and impact productivity. The interconnected nature of the drainage system demonstrates that even if damage to a tile line happened within the project boundaries, non-participating landowners could experience impacts to crop yield. Additionally, the decommissioning plan indicates that the site will be restored to its prior use[231] (95 percent cultivated farmland). Damage to drainage systems within the project boundaries could prevent participating landowners from returning their land to agricultural practice.

Figure 31. County Ditch 29



Lyon County Ditch 29

Lyon County maintains and operates County Ditch 29, located in the southwestern portion of the project (Figure 31). This ditch provides important drainage functions for the surround farmland, roads, the railroad, and the city of Garvin. County Ditch 29 is currently in need of repair and significant portions of the ditch will be replaced over the next several years. The Lyon County Drainage Authority is aware of drainage issues within the Garvin city limits and will likely order a redetermination of benefits for County Ditch during 2025. Repair of the ditch system will require the use of excavators and will consist of replacing the old drain tile with new drain tile. During ditch

[230] Rui, Y., Goller, B., & Kladivko, E. (2024). Long-term crop yield benefits of subsurface drainage on poorly drained soils. DOI: 10.1002/agj2.21621

[231] SPA, Appendix F: Decommissioning Plan.

repair, an 80-foot temporary right of way is acquired to accomplish the installation. If the repairs are not completed before the construction of the solar facility, an onsite investigation is necessary to identify the exact location and depth of the drain tile.

Any damage to County Ditch 29 caused by construction could impact productivity on the surrounding farmland and impede drainage in the city of Garvin and surrounding infrastructure. Portions of the ditch are surrounded by a 16.5-foot vegetated buffer, as required by Minnesota's Buffer Law[232] to protect state water resources from erosion and runoff pollution by filtering out nitrogen, phosphorus, and sediment. Damage to the vegetated buffer from construction or operation of the project could result in a loss of runoff filtering services, increasing pollution and sedimentation into the surrounding water systems.

County Ditch 29 is a legal drainage system established under Minnesota Law currently known as Minnesota Statutes Chapter 103E. Any activity that disturbs the ditch must comply with the relevant portions of drainage law.

MITIGATION

Several sections of the DSP (**Appendix B**) 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".
- 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. Coneflower Solar has included a draft VMP as Appendix E of its site permit application.
- Section 4.3.18 requires the permittee to develop an AIMP with MDA. Coneflower Solar's draft AIMP (Appendix D 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.

[232] Minnesota Statute 103F.48.

- 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 4.3.25 requires the permittee to avoid, repair, or replace all drainage tiles broken or damaged during all phases of the project's life.
- Section 4.3.29 requires the permittee to fairly restore or compensate landowners for damages to crops, fences, drain tile, etc. during construction.

Coneflower 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 performing regular inspections during any earthmoving phases, preventing soil profile mixing, monitoring compaction, limiting vehicle traffic within the site, 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, Coneflower Solar indicates that disturbed areas would be repaired and restored to pre-construction contours and characteristics to the extent possible.[233,234]

Reduced or lost farming revenues may be offset by leasing agreements, which are outside the scope of this document.

Lyon County Ditch 29

Coneflower Solar has designed the project in consideration of the 16.5-foot vegetated buffer that surrounds sections of County Ditch 29. The project fence line will be placed at the edge of the cropland adjacent to the vegetated buffer,[235] preventing damage to the filtration system that protects the surrounding water ways. The DSP (**Appendix B**) proposes special conditions related to mitigating impacts to County Ditch 29 resulting from the construction or operation of the project:

- Section 5.7 requires the permittee to inform the Lyon County Drainage Authority of construction timelines and access plans in relation to County Ditch 29. The permittee will provide the Lyon County Drainage Authority with the contact information of the field representative.

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 and community activities during construction, however impacts will be temporary.

Tourism in the local area is primarily limited to outdoor recreational activities, including snowmobile trails and public lands, along with local community events. The nearby city of Balaton, approximately

[233] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[234] SPA, Appendix E: Vegetation Management Plan.
[235] EA, Appendix C, Question 16.

7 miles northwest of Garvin, is home to the Balaton Bay Golf Course as well as various sports complexes for frisbee golf, baseball, and softball. Additionally, Balaton hosts a yearly Fun Fest the first weekend in July with a parade, street dance, bags and golf tournaments, and firework shows. The city of Marshall, approximately 17 miles north of Garvin, hosts the annual Lyon County Fair every August. Events at the Lyon County Fair include a rodeo and demolition derby, alongside carnivals rides, livestock shows, exhibits, events, and contests.

POTENTIAL IMPACTS

All project facilities will be located on privately-owned land, therefore impacts to tourism and recreation are anticipated to be minimal. Minimal impacts to outdoor recreational activities could occur during construction due to noise and traffic increase, however these impacts will be temporary and short-term in duration. Attendees of Balaton's Fun Fest traveling along US 14 may experience minor travel impacts if the event coincides with construction phases characterized by increased traffic.

MITIGATION

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

4.5.3 Mining

The ROI for mining is the land control area. Impacts to mining are **not anticipated**.

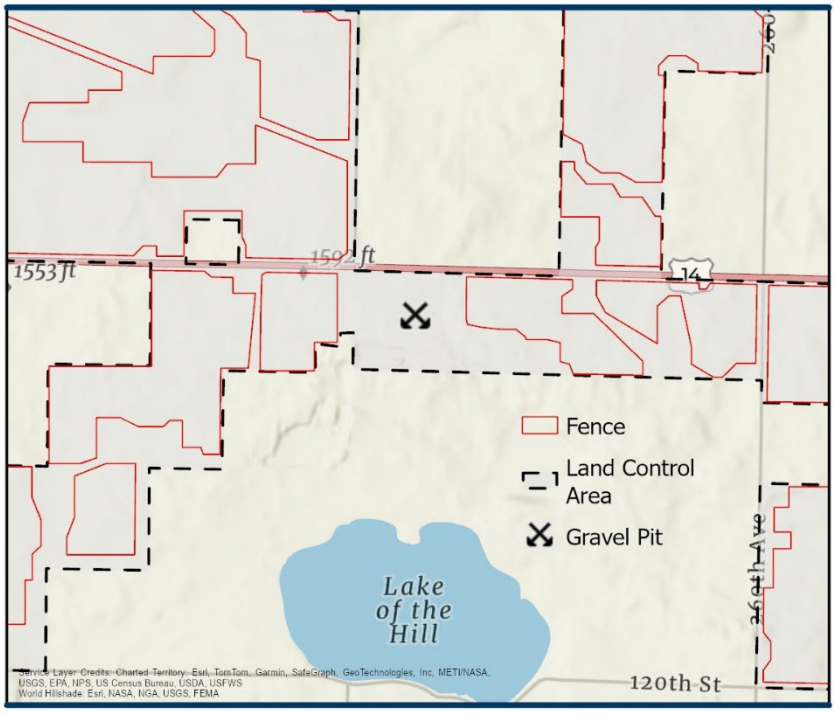
Coneflower Solar identified one sand/gravel mining operation within the land control area, mapped as a gravel pit on U.S. Geological Survey Topographic Maps.[236] The mini operation is located south of US 14 and north of Lake of the Hill (Figure 32), in a participating parcel.

POTENTIAL IMPACTS

Coneflower Solar has coordinated with the landowner to ensure project construction and operation will not impact the mining operation. Solar panel siting on the parcel containing the sand/gravel pit is limited and the underground collection lines are located immediately adjacent to the road ROW to prevent interference with mining operations. Coneflower Solar has entered into an Accommodation Agreement with the parcel's landowner that acknowledges Coneflower Solar has sited solar facilities to avoid the landowner's mining operation and that the mining operation will not extend into the preliminary development area.

[236] Horton, J.D., and San Juan, C.a., 2021, Prospect- and Mine-Related Features from U.S. Geological Survey 7.5- and 15-Minute Topographic Quadrangle Maps of the United States (ver 10.0, May 2023): U.S. Geological Survey data release, https://doi.org/10.5066/F78W3CHG.

Figure 32. Active Gravel Pit



MITIGATION

The Accommodation Agreement developed with the landowner avoids any potential impacts to mining operations that could result from the construction or operation of the project. 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.[237] Historic resources are sites, buildings, structures, or other antiquities of state or national significance.[238]

[237] Minnesota Statutes, Section. 138.31, subd. 14.
[238] Minnesota. Statutes, Section 138.51.

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

Coneflower Solar reports contacting the eleven federally recognized Tribal Nations in Minnesota, including Minnesota Tribal Nations' Tribal Historic Preservation Officers (THPOs) and the Minnesota Indian Affairs Council (MIAC) for additional information or comment on the project.[239] MIAC noted that the proposed project intersects with, and is near, several state archeological sites, and is located within an area that is likely to contain cultural resources. MIAC recommended Coneflower Solar conduct additional research and cultural management fieldwork with monitoring alongside tribal consultation to regional THPOs.[240]

Coneflower Solar hired a contractor to conduct a Phase Ia literature review for the land control area and 1-mile project area radius. The survey examined records from the Minnesota State Historic Preservation Office (SHPO) and Minnesota Office of the State Archeologist (OSA). In addition, the National Register of Historic Places (NRHP) database was consulted, along with a review of available historic maps.

Historic Architecture Resources

The historic architecture literature review, conducted in November 2023, identified 17 previously recorded historic architectural resources, none of which are within the land control area. All 17 previously recorded architectural resources had been recommended not eligible for listing on the NRHP. During the literature review, an additional 50 locations were identified as having structures old enough to be evaluated for the NRHP.

The historic architecture literature review was followed by a historic architecture survey in the project area. All 17 of the previously recorded historic architectural resources were recommended not eligible for listing based on the survey, and the project will not impact any of these sites. Forty-eight of the 50 unevaluated locations identified in the literature review were either recommended not eligible for listing based on the survey and/or contained structures that were unable to be accessed and remain unevaluated. The remaining two locations, both farmsteads, contain structures that are recommended eligible for the NRHP, a brick silo and a prairie-style barn. These two locations are outside the land control area and will not experience direct impacts from the project, and the distance from the project, topography, and shelterbelts will prevent either location from experiencing aesthetic impacts. [241]

Archaeological and Cultural Resources

The cultural resources literature review, conducted in late 2023, identified one previously recorded archaeologic site within the 1-mile study area. This site is within the land control area itself and had

[239] SPA, Appendix C: Agency Correspondence.
[240] Id.
[241] SPA, Appendix H: Phase I Historic Architecture Survey.

previously been determined not eligible for the NRHP in 1980.[242] The cultural resources literature review was followed by a Phase I cultural resources survey in November 2023 and January 2024, with an additional field visit conducted by an archaeologist in July 2024.

The survey consisted of systematic pedestrian surveys along 15-meter transects with subsurface testing via shovel test unit excavation performed if a surface artifact was located. Two previously unrecorded cultural resources were documented in the land control area during the survey, both historical artifact scatters recommended not eligible for the NRHP. Additionally, one previously recorded not eligible site was revisited. The archaeological site identified during the literature review remains unevaluated for the NRHP.

Two Traditional Cultural Specialists (TCS) with the Upper Sioux Community THPOs were present during the Phase I archaeological survey. Four Traditional Cultural Properties were documented in two discrete areas within the land control area by the TCS staff. These areas were mapped for avoidance.

Shovel tests were conducted along the presumed edges of the known archeological site and in a central portion of the land control area during the July 2024 field visit. The shovel test found no artifacts in any locations, and the boundary of the site was determined. The inner portion of the archeological site remains unevaluated for NRHP listing.

Coneflower Solar provided the draft Phase I archaeological survey report to the SHPO for concurrence and received concurrence on September 5, 2024. The report was filed to the Commission on September 18, 2024.[243]

MITIGATION

Prudent siting to avoid impacts to archaeological and historic resources is the preferred mitigation. Section 4.3.23 of the DSP (**Appendix B**) address archeological resources and requires 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.

No impacts to architectural resources are anticipated as a result of the project. Out of the 17 previously recorded 50 newly recorded architectural resources, only two of the newly recorded resources were recommended eligible for the NRHP. These two resources are located outside the land control area and will not be affected by the project.

No impacts to the archaeological resources are anticipated as a result of the project. The archaeological resource identified during the literature review remains unevaluated, and the two resources identified during the survey are recommend not eligible for the NRHP.

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[242] SPA, p. 76.
[243] Coneflower Solar, Reply Comments, September 18th 2024, eDockets number: 20249-210296-02.

Coneflower Solar has placed a 100-foot buffer around the four Traditional Cultural Properties to prevent impacts from project activities. Impacts to previously unrecorded cultural resources or human remains encountered during project construction can be mitigated by preparing an Unanticipated Discoveries Plan that outlines the steps to be taken should this occur. Section 5.8 of the DSP is a special condition requiring the permittee to develop an Unanticipated Discoveries Plan (UDP) to identify guidelines to be used in the event previously unrecorded archeological or historic properties, or human remains, are encountered during construction, or if unanticipated effects to previously identified archaeological or historic properties occur during construction. This is in addition to and not in lieu of any other obligations that may exist under law or regulation relating to these matters. The UDP shall describe how previously unrecorded, non-human burial, archeological sites found during construction shall be marked and all construction work must stop at the discovery location. The permittee is required to file the UDP with the Commission at least 14 days prior to the preconstruction meeting.

No additional mitigation is proposed.

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

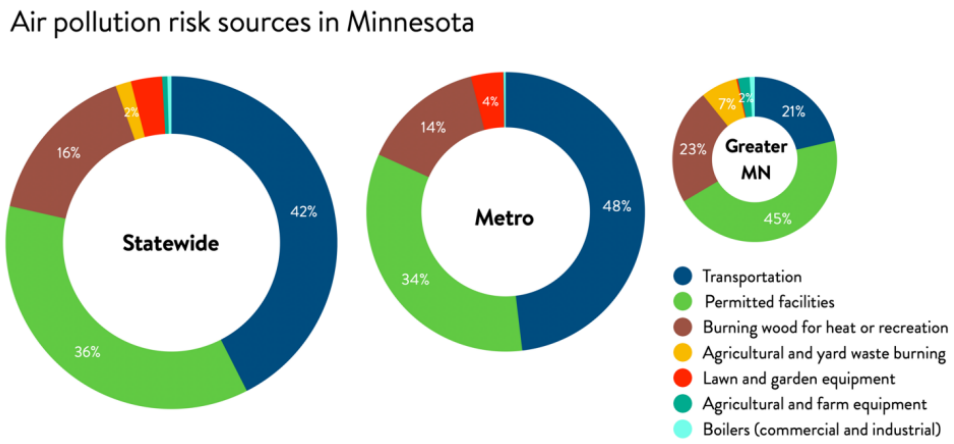
The ROI for air quality is the region. Potential impacts to air quality during construction would be intermittent, localized, short-term, and **minimal**. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated. Once operational, the solar array will not generate criteria pollutants 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. Regulation and voluntary action throughout Minnesota has led to a reduction in air pollution over time. As a result, overall air quality in Minnesota has improved over the last 20 years, and the state has generally remained in compliance with tighter national ambient air quality standards (NAAQS). However, current levels of air pollution still contribute to health impacts, and environmental justice communities are still disproportionately affected by air pollution.

As illustrated in Figure 33, today, most of our air pollution comes from smaller, widespread sources that we all contribute to on our own such as vehicles and lawn equipment. Additionally, increasing

trends of fine particle concentrations from Western wildfire smoke infiltrating Minnesota skies are expected to continue due to climate change.[244]

Figure 33. Air Pollution Sources by Type



In Minnesota, air quality is tracked using air quality monitoring stations at 59 sites across the State. The MPCA uses data from these monitors to calculate the Air Quality Index (AQI) on an hourly basis, for ozone (O3), particulate matter (PM10/PM2.5), sulfur dioxide (SO2), nitrogen dioxide (NO2), and carbon monoxide (CO). The AQI is used to categorize the air quality of a region as one of five levels: good, moderate, unhealthy for sensitive groups, unhealthy, or very unhealthy.[245]

Air quality in the project area is relatively better than more populated areas of the state such as the Twin Cities metro region. According to MPCA models, air pollution in the project area's census tract is in the lowest 10 percent of all air scores in Minnesota. The top four air pollutants are ammonia, PAHs, acetamide, and benzene, released from agricultural equipment, recreational vehicles and boating, and wood burning, but no air pollutants are above the health benchmarks.[246]

The nearest air quality monitor to the project is in Marshall, Minnesota, approximately 17 miles north of the land control area. The station monitors ozone and fine particles (PM2.5). Table 27 lists the daily

[244] The State of Minnesota's Air Quality, January 2025 Report to the Legislature, https://www.pca.state.mn.us/sites/default/files/lraq-1sy25.pdf
[245] 2025 Air Monitoring Network Plan for Minnesota. https://www.pca.state.mn.us/sites/default/files/aq10-24a.pdf
[246] Pollution Control Agency (n.d.). *MNrisks: Pollutant Priorities*, retrieved from: https://experience.arcgis.com/experience/bff19459422443d0816b632be0c25228/page/Page/?views=Air-pollution-score

air quality index category for the area for the past 7 years.[247] Overall, air quality is largely categorized as good throughout the year, with some moderate days occurring. There were a handful of unhealthy for sensitive groups and unhealthy days in the last three years (2021-2023), but no very unhealthy days.

Table 27. Daily Air Quality Index Categories in Marshall, Minnesota

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2017	307	53	0	0	0
2018	309	56	0	0	0
2019	305	56	0	0	0
2020	309	51	0	0	0
2021	263	91	3	2	0
2022	303	51	0	2	0
2023	206	142	10	3	0

Potential Impacts

Construction

Minimal intermittent air emissions are expected during construction of the solar 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 overhead gen-tie line will generate criteria pollutants or carbon dioxide.

Air emissions from project construction activities 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 majority of the soils in the land control area are low to moderately susceptible to wind erosion, with a small amount considered highly susceptible. Dry conditions may enhance soil erodibility. 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. The land control area is bordered by several unpaved roads and

[247] MPCA. *Annual AQI Days by Reporting Region.* Retrieved from: https://data.pca.state.mn.us/views/Minnesotaairqualityindex/AQIExternal?%3Aembed=y&%3AisGuestRedirectFromVizportal=y

increased vehicular traffic anticipated during the construction phase could intensify dust emissions for area residents.

Operation

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 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

Coneflower Solar indicates that best management practices will be used during construction and operation of the project to minimize dust and emissions. Exhaust emissions can be minimized by using modern equipment with lower emissions ratings and properly functioning exhaust systems, not running the equipment unless necessary, and minimizing the number of driving trips. Watering exposed surfaces, covering open-bodied haul trucks, reducing speed limits on unpaved roads, containing excavated materials and treating stockpiles, and protecting and stabilizing soils are all standard construction practices.[248]

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.

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.[249]

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 are anticipated to be **minimal** and 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 is within Province 5, the Western Province, and is characterized by moderate surficial sands and limited buried sands. Province 5 is underlain by fractured bedrock buried

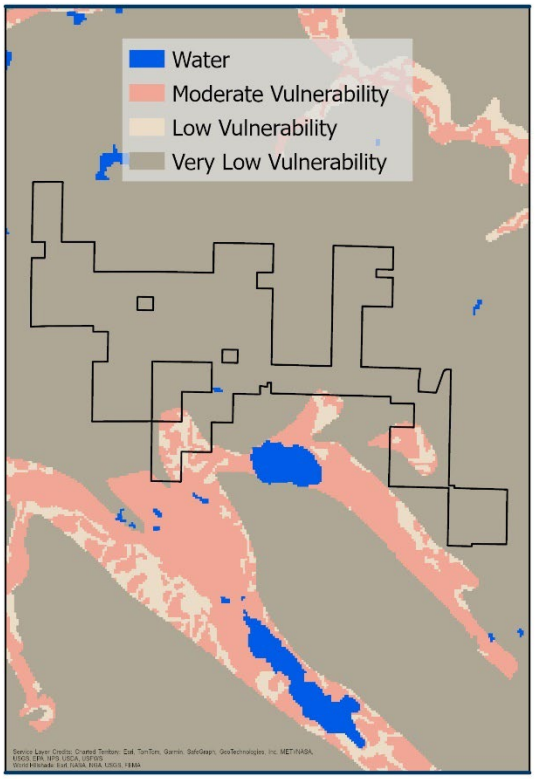
[248] SPA, p. 78.
[249] SPA, Appendix D: Agricultural Impact Mitigation Plan.

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.[250]

Pollution sensitivity of near surface materials in the land control area are mostly in the "low" to "very low" category, with a small amount of "moderate" area around the Lake of the Hill and the two southern WPAs (Figure 34).[251] 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.[252]

The project area is overall expected to have low groundwater pollution sensitivity; contaminants from the land surface in the "low" pollution sensitivity areas would not reach groundwater for weeks to months, while contaminants from the land surface in the "very low" pollution sensitivity areas would not reach groundwater for months to a year. Contaminants from the land surface in the "moderate" groundwater pollution sensitivity area would reach groundwater in one to several weeks.[253] 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.

Figure 34. Pollution Sensitivity within Project



Mean depth to bedrock beneath the project is estimated to be 265 ft.[254] Depth to water table in the preliminary development area ranges from just below the surface to more than 200 inches depending on the soil type.[255] Depth to water table is shallower in the hydric soils and areas delineated as wetland or along watercourses, and deeper in the non-hydric soil units. In areas with drain tile, the depth to groundwater is altered and likely deeper than what has been reported on the USDA Web Soil

[250] DNR, Minnesota Groundwater Provinces (2021) https://www.dnr.state.mn.us/waters/groundwater_section/mapping/provinces.html
[251] Minnesota Natural Resource Atlas, retrieved from https://mnatlas.org/gis-tool/.
[252] 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.
[253] 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 .
[254] Minnesota Natural Resource Atlas – Depth to Bedrock. Retrieved from: https://mnatlas.org/gis-tool/
[255] Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Survey. Prior to construction, Coneflower Solar will conduct a geotechnical investigation to confirm the depth to groundwater.

Minnesota Well Index

The land control area was reviewed for EPA designated sole source aquifers, wells listed on the MWI and MDH Wellhead Protection Areas (WHPAs).[256] The MDH maintains the 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 land control area, however, as of 2025, there are 29 active domestic wells, two "other" wells, five monitor wells, and 39 unverified wells within approximately one-half mile of the project, ranging from 15 to 428 feet in depth.[257]

Wellhead Protection Areas

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. WHPAs are determined by MDH as "areas surrounding public water supply wells that contribute groundwater to the well. In these areas, contamination on the land surface or in water can affect the drinking water supply."[258] 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). The MDH mapping layer also includes the Drinking Water Supply Management Areas (DWSMA) and SWSMA Vulnerability rankings. A search in the MDH database indicated that the nearest WHPA and DWSMA to the project are in the City of Balaton, 1.4 miles west of the project. There are no WHPAs or DWSMAs in the land control area.[259]

POTENTIAL IMPACTS

Potential impacts to geology and groundwater can occur directly or indirectly. Direct impacts to groundwater are generally associated with construction, for example, structure foundations that could penetrate shallow water tables or groundwater usage. Both the tracking rack and fences may require some concrete foundations, geochemical testing will determine the final foundation installation process. If concrete foundations are needed, it will be locally sourced and an on-site concrete batch plant will not be required.[260] If concrete foundations are used, some portion of the

[256] SPA, p. 83.
[257] MDH (n.d.) *Minnesota Well Index* https://www.health.state.mn.us/communities/environment/water/mwi/index.html .
[258] MDH. (n.d.). *Source Water Protection Web Map Viewer*. Retrieved from: https://mdh.maps.arcgis.com/apps/View/index.html?appid=8b0db73d3c95452fb45231900e977be4
[259] Id.
[260] SPA, p. 84.

soluble components of the cement paste might leach into groundwater prior to the setting and hardening of the concrete. This will change the pH of groundwater around the surface of the concrete but should not extend far from the foundation.[261]

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. Coneflower 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.[262]

If the project facilities include oil storage of more than 1,320 gallons, a Spill Prevention, Control, and Countermeasure (SPCC) Plan would be required. Coneflower Solar states that they will prepare an SPCC Plan prior to construction for construction-related fuel storage and prior to operation for operation-related fuel storage, should said storage exceed applicability thresholds.[263] They will prepare and implement an SPCC Plan for the main transformer at the project substation in accordance with EPA requirements.[264]

The water supply needs of the project will be limited, and Coneflower Solar does not anticipate impacts to resources such as aquifers and water wells. However, because of the shallow depth to groundwater in some areas of the project, dewatering may be required during construction. Dewatering will be discharged to the surface to allow it to infiltrate back into the ground, minimizing impacts. If dewatering exceeds 10,000 gallons of water per day, a DNR water appropriation permit will be required.[265] There are no MDH mapped water wells within the land control area; the closest domestic well is 118.6 feet away from the project, and the project is 240.2 feet from the nearest residence, minimizing the risk of impacts on unmapped public wells.[266]

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. Construction of the project is not likely to require subsurface blasting, and newly fractured bedrock causing disturbances to groundwater flow is not anticipated.[267]

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[261] See Department of Commerce (May 14, 2018) *Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project*. Retrieved from: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/34748/1%20Text%20Figures%20Tables.pdf

[262] SPA, p. 84.

[263] SPA, pp. 7-9, Table 2.5-1: Potential Permits and Approvals for the Coneflower Solar Project.

[264] SPA, p. 52.

[265] DNR, Water Use Permits: retrieved from: https://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html

[266] SPA, p. 84.

[267] Id.

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 onsite 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. Coneflower 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.

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, Coneflower Solar should cap and abandon the well in place in accordance with MDH requirements.

Because the project will disturb more than one acre, Coneflower 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, Coneflower 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 B**) 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 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 Coneflower 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.[268]

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.

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 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. Because the soil at the

[268] SPA, pp. 84-85.

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 land control area (Table 28) are made up of nearly level, well drained, fine-loamy soils. Hydric soils cover approximately one-quarter of the site (563.3 acres). Topsoil in the land control area, including the preliminary development area, has a thickness ranging from 0 – 18+ inches. Overall, the site is not highly susceptible to either wind or water erosion, with the majority of soils having low to moderate susceptibility to both wind and water. There is a small number of soils in the land control area (approximately 14.5%) that are highly water erodible; no soils in the land control area are highly wind erodible.

The soils within the land control area are only somewhat susceptible to compaction (approximately 59% "low" compaction-prone and 41% "medium" compaction-prone), but almost all the soils are highly susceptible to rutting (97% severe rutting hazard). Compaction and rutting will worsen when heavy equipment is used on fine- or medium-textured soils with wet conditions. Most of the soils within the preliminary development area and land control area are designated prime farmland (60%)[M,G], and the rest is designated farmland of state importance (11%)[M,G], prime farmland if drained (24%)[M,G], and not prime farmland (5%)[G].[269]

Table 28. Soil Types in Solar Facility Land Control Area[270,271]

Soil Type	Slopes	Drainage Class	Acres	Percent of Project
Pits, gravel-Udipsamments complex	-----	----	0.3	0.0
Buse, eroded-Wilno complex	12-18%	Well drained	11.0	0.5
Hokans-Svea complex	1-4%	Well drained	576.3	25.1
Svea loam	1-3%	Moderately well drained	181.4	7.9
Barnes, occasional saturation-Buse-Svea complex	1-6%	Well drained	534.7	23.3
Lakepark-Roliss-Parnell, depressional, complex	0-3%	Poorly drained	296.5	12.9
Vallers clay loam	0-2%	Poorly drained	65.6	2.9
Marysland loam	0-2%	Poorly drained	1.0	0.0
Poinsett-Waubay silty clay loams	1-6%	Well drained	4.2	0.2
Fulda silty clay	0-2%	Poorly drained	6.6	0.3
Parnell silty clay loam, depressional	0-1%	Very poorly drained	185.0	8.0
Buse, moderately eroded-Sandberg complex	12-18%	Well drained	9.8	0.4
Barnes, occasional saturation-Buse-Arvilla complex	2-6%	Well drained	47.8	2.1

[269] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[270] SPA, pp. 86-88, Table 5.5-3: Soil Types and Characteristics within the Project Area.
[271] SPA, Appendix D: Agricultural Impact Mitigation Plan.

Buse, moderately eroded-Barnes, moderately eroded-Arvilla complex	6-12%	Well drained	12.2	0.5
Highpoint Lake silty clay	0-2%	Moderately well drained	5.3	0.2
Rauville silty clay loam, frequently flooded	0-1%	Very poorly drained	0.8	0.0
Darnen loam	2-6%	Well drained	15.0	0.7
Arvilla-Sandberg complex	2-6%	Somewhat excessively drained	47.7	2.1
Sandberg-Arvilla complex	6-12%	Excessively drained	13.3	0.6
Southam silty clay loam	0-1%	Very poorly drained	7.7	0.3
Balaton loam	1-3%	Moderately well drained	13.2	0.6
Fordville loam, coteau	0-2%	Well drained	1.6	0.1
Renshaw-Fordville loams, coteau	2-6%	Somewhat excessively drained	2.7	0.1
Sverdrup sandy loam	0-2%	Well drained	5.8	0.3
Sverdrup sandy loam	2-6%	Well drained	0.5	0.0
Buse, stony-Wilno complex	18-25%	Well drained	7.4	0.3
Barnes-Buse complex, moderately eroded	6-12%	Well drained	246.0	10.7
Solar Facility Subtotal			**2,299.4**	

Potential Impacts

Primary impacts to soils include compaction from construction equipment, soil profile mixing during grading and pole auguring, rutting from tire traffic, drainage interruptions, 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 2,299 acres within the land control area. Of this, approximately 1,723 acres will be graded, which consists of cutting and filling earth in targeted areas, to provide a level and stable base for the project substation and access roads, and spot grading at select solar array and inverter skid locations when the arrays cannot follow existing grades. The location is relatively level, with the majority of soils in the 0-5% slope range, and Coneflower Solar will minimize grading to the extent practicable.

Topsoil depth varies throughout the land control area, but most of the land is characterized by topsoil depths between 12 and 18 inches. Grading and excavating will separate the first 12 inches of topsoil, which will be stored on-site and replaced when construction is completed. Approximately 27.6[M] or 35.0[G] miles of underground collector and communication lines will be installed in one- to two-feet

wide trenches or conduits at least 4 feet below the surface.[272] Coneflower Solar's use of a hanging harness system to mount the DC cables underneath panels minimizes additional soil disturbances, as the DC cables will not require trenching.

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. Inadvertent disturbance of drain tile from construction activities could disrupt existing drainage. Coneflower Solar will maintain, repair, relocate, or replace existing drain tile (if damaged by project construction or operation) as needed.

The soils within the land control area are generally fine-loamy in texture and well drained. As a result, the soils are susceptible to compaction or rutting during wet conditions due to the fine texture of the soil.

Soil cover and management at the solar facility will change from cultivated cropland to a mixture of impervious areas with native groundcover and fescue plantings and semi-impervious surfaces. Once permanent vegetation is properly established, stormwater management, as well as general soil health, will likely improve with the use of native plants. Soil cover and soil health are maximized by the use of native seed mixes, particularly deep-rooted native species. These high-diversity native seed mixes increase soil carbon storage and biomass of soil microbes,[273] and the penetrating root systems allow for greater water infiltration,[274] reducing soil erosion. These soil characteristics are important for growing crops, making the use of diverse, native seed mixes beneficial to participating landowners who return their parcels to agricultural production following project decommissioning. Turfgrass and low-grow fescue seed mixes, which have shallower root systems, do not provide soil benefits to the same extent.

The location and amount of stored topsoil will be documented to facilitate re-spreading of topsoil after decommissioning. The segregated topsoil will have temporary and permanent stabilization measures established to prevent erosion. 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.

Once project construction is complete, Coneflower Solar will restore any disturbed areas to pre-construction conditions to the extent possible. BMPs to prevent soil erosion will be implemented, including temporary and permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization.

[272] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[273] Lange, Markus, et al. "Plant diversity increases soil microbial activity and soil carbon storage" 2015. Nature Communications. 6, 6707 (2015).
[274] Wang, H., Zhu, X., Zakari, S., Chen, C., Liu, W., & Jiang, X. (2022). *Assessing the Effects of Plant Roots on Soil Water Infiltration Using Dyes and Hydrus-1D*. https://doi.org/10.3390/f13071095

MITIGATION

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

- Section 4.3.9 requires protection and segregation of topsoil;
- Because the project will disturb more than one acre, Coneflower 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, Coneflower Solar will also develop a 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. 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. Coneflower Solar has included a draft VMP as Appendix E 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. Coneflower Solar has included a draft AIMP as Appendix D 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 to moderate**. Direct impacts to surface waters are not expected. Indirect impacts to surface waters might occur. These impacts will be short- and long-term. Drainage systems within the land control area could extend impacts to the Des Moines and Cottonwood Rivers. 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 two major watersheds, the Des Moines River – Headwater Watershed, and the Cottonwood River Watershed.[275] The National Hydrography Dataset identified 5 unnamed

[275] Minnesota DNR, Minnesota's watershed basins. https://www.dnr.state.mn.us/watersheds/map.html

waterbodies and three unnamed, intermittent tributaries (flowlines) to the Cottonwood River within the land control area.[276]

The DNR's Public Waters Inventory identified no watercourses or basins within the land control area. Public waters include wetlands, water basins, and watercourses of significant recreational or natural resource value in Minnesota. A public waters designation means that DNR has regulatory jurisdiction over the water.[277] There are no Public Waters Inventory (PWI) waterbodies within the area of land control. The nearest Public Waters Inventory (PWI) body of water is Lake of the Hill, approximately 0.3 miles south of the central portion of the project, and Hanson Slough, approximately 0.3 miles northeast of the northwestern portion of the project.[278]

The surface waters within the land control area are limited to county drainage ditches and wetlands. County Ditch 29 is an open and tiled ditch system that crosses the southeastern portion of the project. County Ditch 14 intersects the northwestern portion of the project. The Lyon County Drainage Department manages both ditches and their associated drain tiles within the land control area (Figure 35).[279]

Surface water within the land control area drains south towards the Des Moines River and north towards the Cottonwood River. Surface runoff running north will drain into the county-managed open ditches. County Ditch 29 connects with County Ditch 24, ultimately draining into the Cottonwood River from the southeast, while County Ditch 14 drains into the Cottonwood River from the northwest.[280] 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 land control area. The nearest impaired water is the Lake Shetek Inlet, approximately 0.5 miles southwest of the project, which is listed as impaired for fish bioassessments and fecal coliform. Lake Yankton, approximately 0.8 miles west of the project, is listed as impaired for fish bioassessments and nutrients, and the Cottonwood River, approximately 1.0 miles north of the project, is listed as impaired for *Escherichia coli*, total suspended solids, and fish and benthic macroinvertebrate bioassessments. Both Lake Yankton and the Lake Shetek Inlet drain southeast towards the Des Moines River.[281]

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[276] United States Geological Survey. (2023). *National Hydrography Dataset*, retrieved from: https://data.usgs.gov/datacatalog/data/USGS:ecd2ad5e-faa2-4291-bcdb-441b7113ea41

[277] Public waters are defined in Minnesota Statute 103G.005, subdivision 15.

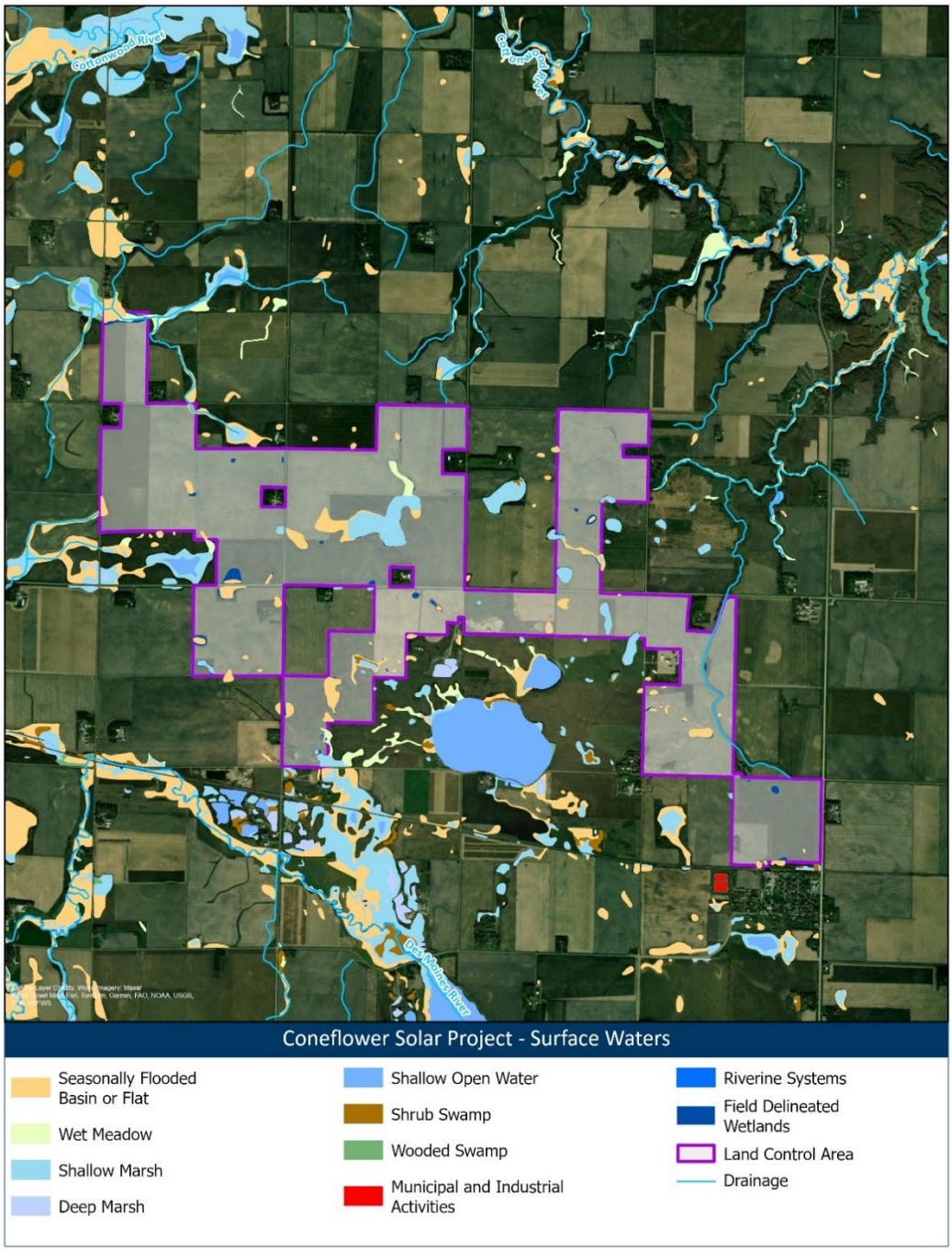
[278] Minnesota DNR. *Public Waters (PW) Basin and Watercourse Delineations*. Minnesota Geospatial Commons: https://gisdata.mn.gov/dataset/water-mn-public-waters

[279] SPA, p. 94.

[280] SPA, p. 94.

[281] MPCA, MPCA Impaired Waters Viewer https://gisdata.mn.gov/dataset/impaired-waters-viewer

Figure 35. Project Surface Waters



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. There are no FEMA 100-year floodplains within the vicinity of the project. The nearest FEMA 100-year floodplains are associated with portions of the Des Moines and Cottonwood Rivers, south and north of the project.[282]

POTENTIAL IMPACTS

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 reaches nearby surface waters. The land control area ultimately drains into the Cottonwood and Des Moines River, two crucial water resources that provides important watershed drainage, ecosystem, and recreational functions. The Cottonwood River is listed as an impaired water body, and numerous impaired waterbodies outlet into the Des Moines River. If appropriate erosion controls are not implemented during construction of the project, increased deposition of sediment or fugitive dust into these surface waters from stormwater runoff could occur.

Increase sedimentation resulting from inadequate stormwater management during construction of the project could lead to negative impacts on water quality. Negative impacts could be short-term or long-term depending on the size of the sediment loads deposited into the Cottonwood and Des Moines Rivers. Increased sedimentation via stormwater runoff could degrade the Cottonwood or Des Moines River by increasing turbidity, intensifying bank erosion, impacting channel morphology, or affecting aggradation and flood capacity – all factors influenced by river sediment load.[283] Damage to a river's flood capacity resulting from insufficient stormwater runoff management may change the predicted flood risk in the FEMA 100-year floodplain surrounding the river.

Overall, the project is expected to have a long-term positive impact on water quality due to the establishment of perennial vegetation at the solar facility. Perennial, deep-rooted native species have the greatest positive impact on water quality. The current array seed mix in Coneflower Solar's draft VMP is composed of a large amount of low-grow fescue, which, unlike native species, does not develop an extensive root system. This makes fescue systems more susceptible to soil erosion,

[282] SPA, p. 95.

[283] Vázquez-Tarrío, D., Ruiz-Villanueva, V., Garrote, J., Benito, G., Calle, M., Lucía, A., & Díez-Herrero, A. (2024). *Effects of sediment transport on flood hazards: Lessons learned and remaining challenges*. DOI: https://doi.org/10.1016/j.geomorph.2023.108976

increasing sedimentation into surrounding water systems. The impacts and mitigation of the array seed mix are further discussed in Section 4.7.6.

MITIGATION

Coneflower Solar will manage stormwater by installing a series of stormwater ponds throughout the project. While the final number, location, and size of the stormwater ponds has not been determined, Coneflower Solar anticipates that the final design will be similar to Figure 16. The stormwater ponds will be designed to meet storage volumes and provide the necessary treatment, in compliance with the NPDES/SDS Construction Stormwater General Permit. The stormwater pond areas will be seeded with a wet seed mix intended to help with soil stabilization after rain events.

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. In addition, best management practices to minimize the impact on surface waters will be utilized as a part of the SWPPP, including BMPs such as silt fencing, revegetation plans, and exposed soil management, to prevent sediment from entering waterbodies.[284]

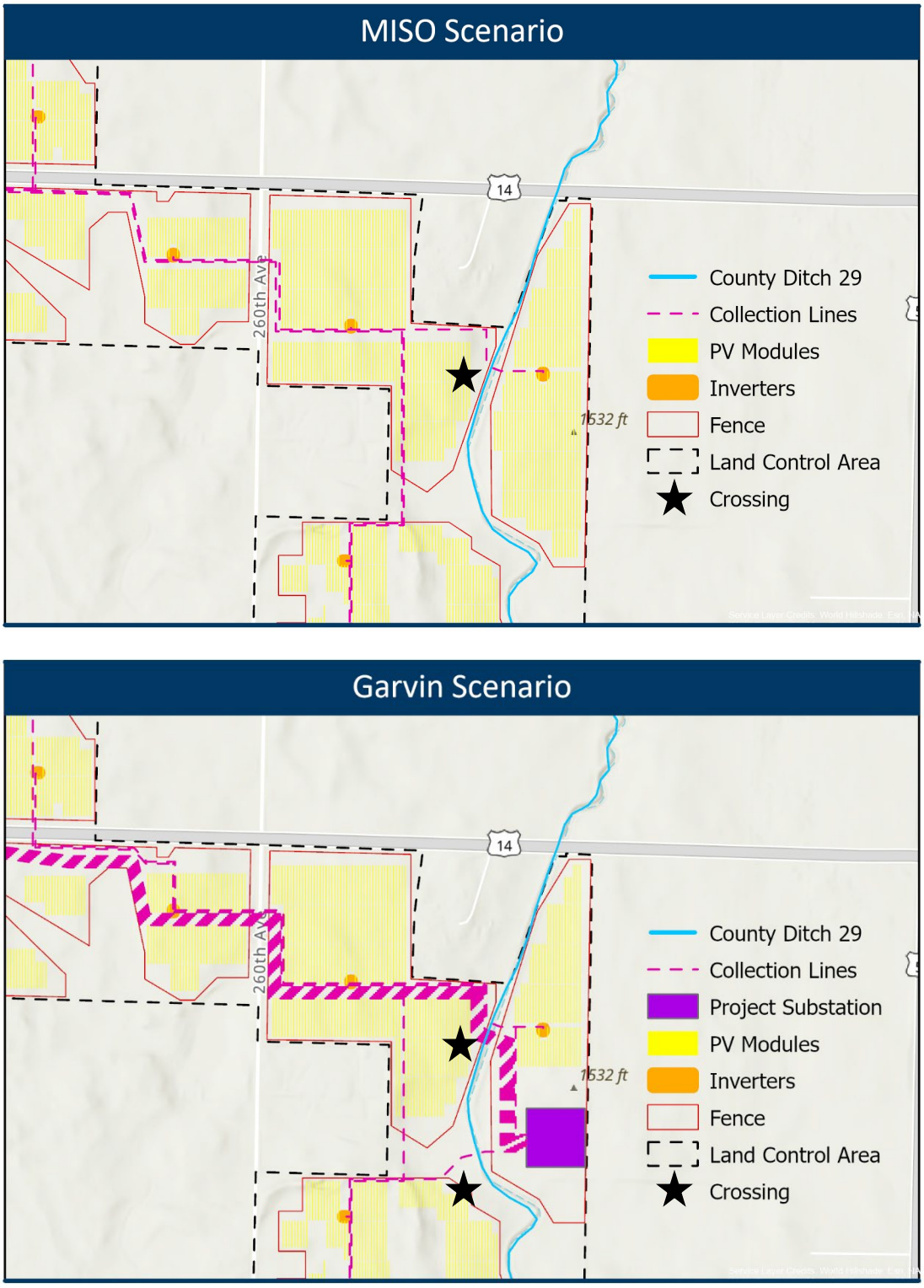
Coneflower Solar has designed the project to avoid impacts to surface waters by siting facility components to avoid surface waters to the extent practicable. Coneflower Solar notes that there is one collection line crossing proposed under County Ditch 29 in the southeastern portion of the project. Coneflower Solar will avoid impacts by boring the collection line crossing beneath the watercourse (Figure 36).

The collection lines will be bored at a distance no closer than 3 feet from the base of County Ditch 29.[285] Due to the location of the project substation, more collection lines will need to be bored under County Ditch 29 in the Garvin Scenario compared to the MISO Scenario.

Coneflower Solar is working with Lyon County and private landowners to identify and locate drain tile within the land control area. If the project design requires county or private drain lines and judicial ditches to be crossed, Coneflower Solar will use directional boring methods to avoid impacting tiles and ditches. Coneflower Solar plans to maintain drainage system integrity during construction, including rerouting, repair, or other methods outlined in the AIMP filed with the Site Permit Application.[286]

[284] SPA, p. 95.
[285] EA, Appendix C, Question 17.
[286] SPA, Appendix D: Agricultural Impact Mitigation Plan.

Figure 36. County Ditch 29 Collection Line Crossing



The DSP (**Appendix B**) 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. Coneflower Solar will also develop a SWPPP that complies with MPCA rules and guidelines. The SWPPP 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 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 to moderate**. Direct impacts to wetlands are not expected. There is a potential for wetlands to be indirectly affected. These impacts will be short- or long-term, of a small size, and localized. Impacts 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.[287]

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 November of 2023. 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.).

This EA uses the NWI-MN to identify wetlands. 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

[287] USEPA. 2022. *What is a Wetland* https://www.epa.gov/wetlands/what-wetland

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, 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.

The wetland mapping using the NWI-MN identified 86 wetlands covering approximately 128.55 acres within the land control area (Table 29).[288] There are no PWI features mapped within the land control area.[289] There are no calcareous fens within one mile of the project, the nearest calcareous fen is 6.5 miles south of the project within the Skandia WMA.[290] Wetland types include Freshwater Emergent Wetlands (Seasonally Flooded), Freshwater Forested/Shrub Wetlands, Freshwater Ponds, and Riverine Wetlands.

Table 29. NWI-MN Wetlands in Project

Wetland Type	Acres
Freshwater Emergent Wetland	121.93
Freshwater Forested/Shrub Wetland	3.43
Freshwater Pond	1.04
Riverine	2.15
Total	**128.55**

Coneflower Solar completed an onsite wetland delineation in July and November of 2023, delineating wetlands totaling approximately 112.5 acres within the land control area, approximately 4.9% of the project. The 112.5 acres make up a total of 60 wetlands, most of which are within row crop agricultural fields that contained functional drain tile.[291]

Table 30[292] summarizes delineated wetlands within the area of land control, which were identified during Coneflower Solar's wetland delineation.

Table 30. Delineated Wetlands

Wetland Type	Acres in Land Control Area
Seasonally Flooded Basin	24.9
Seasonally Flooded Basin, Fresh Wet Meadow	3.9
Seasonally Flooded Basin, Fresh Wet Meadow, Shallow Marsh, Shrub Swamp	2.3

[288] 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
[289] SPA, p. 92.
[290] SPA, p. 93.
[291] SPA, p. 93.
[292] SPA, pp. 93-94, Table 5.5-5: Delineated Wetlands within the Project Area.

Seasonally Flooded Basin, Fresh Wet Meadow, Deep Marsh	0.8
Seasonally Flooded Basin, Fresh Wet Meadow, Shrub Swamp	0.9
Seasonally Flooded Basin, Shallow Marsh	65.1
Seasonally Flooded Basin, Shallow Marsh, Shallow Open Water	0.7
Seasonally Flooded Basin, Shallow Marsh, Shallow Open Water, Shrub Swamp	4.3
Seasonally Flooded Basin, Shrub Swamp, Wooded Swamp	8.0
Fresh Wet Meadow	1.4
Shallow Marsh	0.2
Total	112.5

Potential Impacts

The establishment of perennial vegetation at the solar facility can create a long-term positive impact on wetlands. The extent of these positive impacts will depend on the relative abundance of perennial native species within the project. Once perennial vegetation has established, there will be limited disturbance to ground cover aside from scheduled vegetation management activities. Pesticides and fertilizers can run off into nearby wetlands, creating toxic conditions and nutrient surpluses. The conversion of the land control area from agricultural production to perennial vegetation will positively impact wetlands by reducing pesticide and fertilizer inputs. Perennial, deep-rooted native species have the greatest positive impact on water quality, as their extensive root systems protect against soil erosion. Fescue systems, such as the current array seed mix in Coneflower Solar's draft VMP, are more susceptible to soil erosion due to their shallower root systems, which can increase sedimentation into wetlands. Increased sedimentation into wetlands can alter nutrient cycling and damage ecosystem function. Additionally, increased sedimentation can bury the wetland native seed bank and allow invasives such as Reed Canary Grass (*Phalaris arundinacea*), which is already present on site,[293] to spread. The impacts and mitigation of the array seed mix are further discussed in Section 4.7.6.

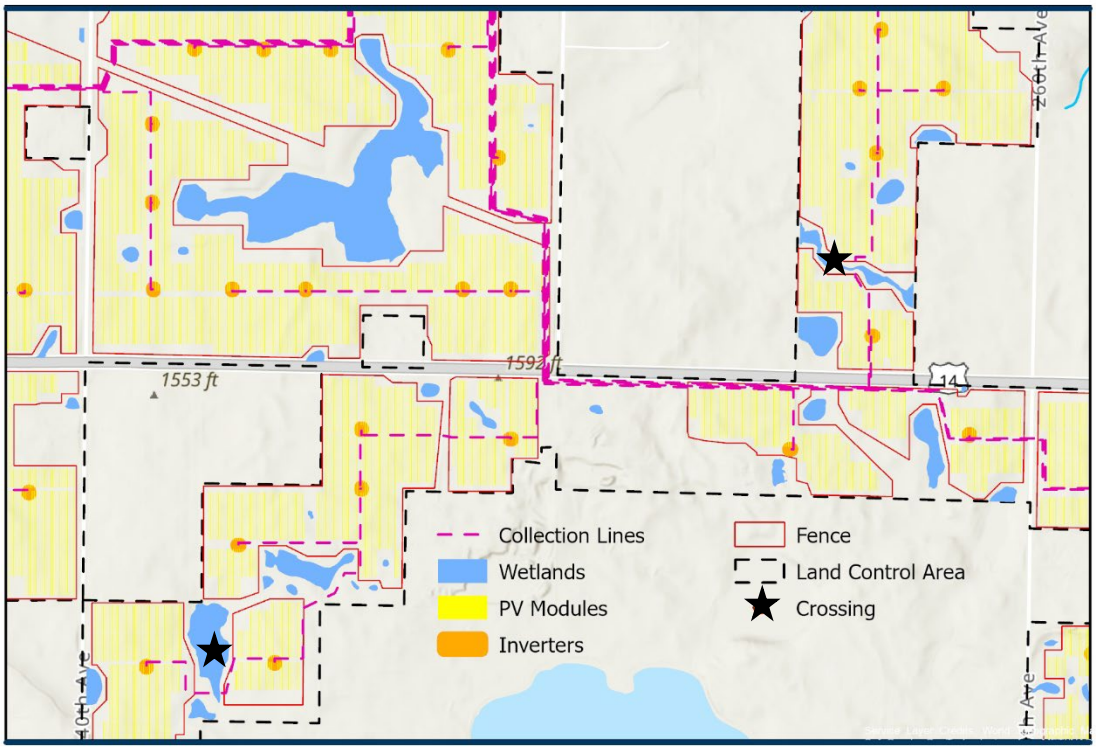
Although 112.5 acres of wetlands have been identified within the land control area, the preliminary layout for the solar facility avoids locating solar arrays and associated facilities in wetlands save for two collection lines crossings under two delineated wetlands, one in the south-central portion of the project, and one located in the north-eastern portion of the project (Figure 37). There is no difference in wetland boring between the Garvin Scenario and the MISO Scenario. Both scenarios have the same two wetlands identified for boring in the preliminary layout.

Coneflower Solar will bore these collection lines beneath the two wetlands to avoid impacts. Coneflower will avoid impacts to these features by boring beneath them and in accordance with the U.S. Army Corps of Engineers (USACE) St. Paul District Utility Regional General Permit conditions.[294]

[293] EA, Appendix C, Question 19.
[294] EA, Appendix C, Question 20.

Additionally, there may be potential for temporary, short-term impacts to wetlands that occur during ground disturbing activities during installation of collection lines and temporary access roads.

Figure 37. Wetland Collection Line Crossing



MITIGATION

The project layout has been designed to avoid all wetlands delineated to date, save for the two planned for bored collection line crossing. If wetland impacts are required for the final layout, Coneflower Solar will obtain any necessary permits and coordinate with the appropriate agency, such as the USACE under Section 404 and 401 of the Federal Clean Water Act (CWA) and the Lyon County SWCD under the Minnesota Wetland Conservation Act (WCA), prior to construction.[295]

If a permit is required, any proposed wetland impact would require full sequencing under the WCA to address wetland avoidance, impact minimization, rectification, and replacement. Additionally, under Section 404, discharge of dredged and fill material into waters of the U.S. would be regulated, most likely under the USACE Regional General Permit (Minnesota RGP-003). If the project needs approval under this general permit, Section 401 Water Quality Certification would be automatically granted as well.

[295] SPA, pp. 7-9, Table 2.5-1: Potential Permits and Approvals for the Coneflower Solar Project.

Section 4.3.13 of the DSP (**Appendix B**) 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 are anticipated to be **minimal to moderate** and can be mitigated through development of a VMP.

The solar facility is located in the North Central Glaciated Plains, Coteau Moraines Subsection (251Bb) subsection of the Prairie Parkland Province. This subsection consists of the middle Coteau, a landscape of rolling moraine ridges, and the outer Coteau, a series of gently undulating to steeply rolling terminal and end moraines separate by ground moraines. The area was historically extensive tall grass prairie with a very small number of wet prairies restricted to the areas around narrow stream margins. Forests were similarly restricted to ravines along a few streams, including the Redwood River. Fire and drought were the most common natural disturbances before settlement; fires in particular were very important in maintaining prairie plant communities. In additional tornadic events associated with thunderstorms are common. There are few remnants of tallgrass prairie remaining, as the current land-use in the subsection is predominately agricultural.[296] The National Land Cover Database provides "spatial reference and descriptive data for characteristics of the land surface" nationwide.[297] The land cover within the project area is dominated by cultivated agriculture, with scattered areas of trees, native vegetation, wetlands, open water, and developed areas around roads and parcel boundaries.

Conservation Easements

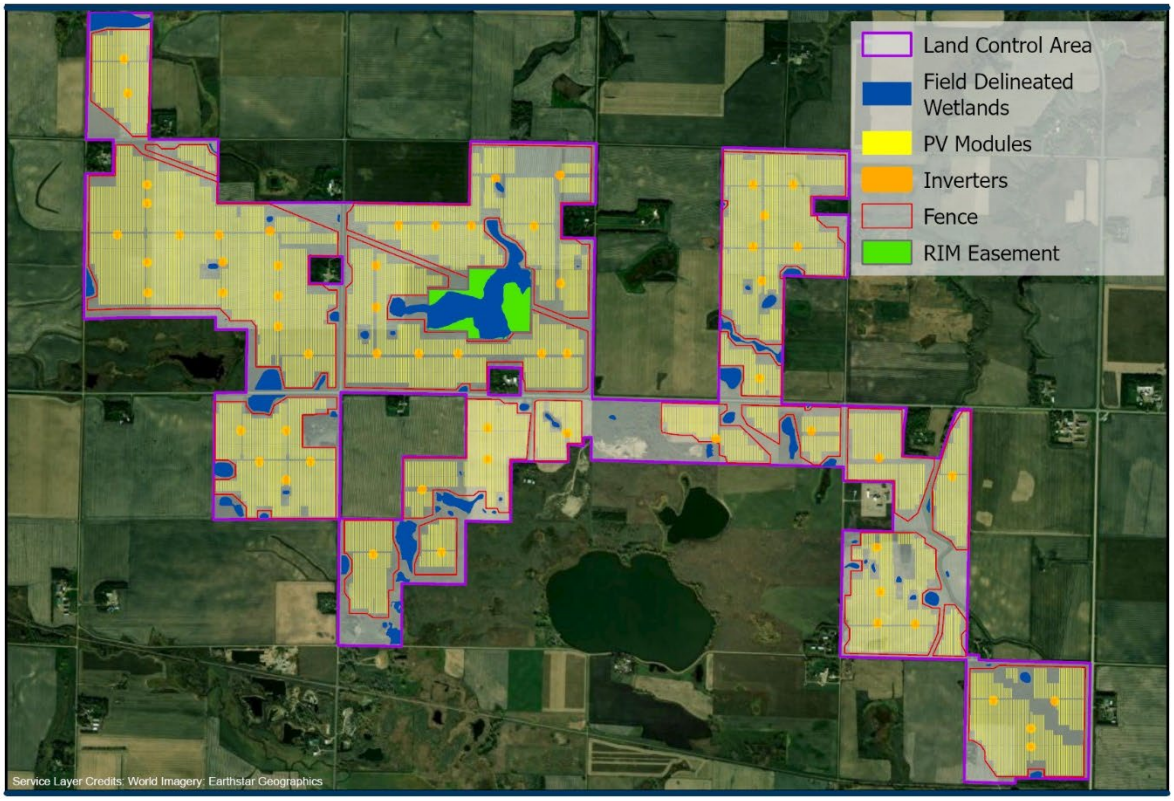
There are two conservation easement lands within the land control area. The first easement type is a large, state funded, Reinvest in Minnesota (RIM) easement centrally located within the project (Figure 38). This RIM easement is classified as a Wetland Restoration, and Coneflower Solar's ATLA survey estimated the easement acreage to be 59.73 acres. The second easement type is a county-proposed flowage easement in the northwestern portion of the project. Coneflower Solar has designed the project to avoid impacts to both easements. During the wetland vegetation, the land control area was noted to harbor several native species, including but not limited to, American Vetch (*Vicia americana*), Canada Milk Vetch (*Astragalus canadensis*), Canada Goldenrod (*Solidago canadensis*), and Phragmites (*Phragmites australis*).[298]

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

[297] U.S. Geological Survey. *The National Land Cover Database*. (February 2012), retrieved from: https://www.usgs.gov/centers/eros/science/national-land-cover-database

[298] EA, Appendix C, Question 19.

Figure 38. RIM Easement



POTENTIAL IMPACTS

Construction of the solar facility will eliminate vegetative cover and create impermeable surfaces at access roads, inverter skids, and laydown yards. 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. Any tall growing woody vegetation in the preliminary development area will be removed. Agricultural land within the solar facility would be converted to perennial, low growing vegetative cover, resulting in a net increase in vegetative cover for the life of the project.

Construction activities at the solar facility could introduce or spread invasive species and noxious weeds. The early phases of site restoration and seeding of native species can result in populations of non-native and invasive species on site. There are already several aggressive native species present on site, including Birdsfoot Trefoil (*Lotus corniculatus*), Canada Thistle (*Cirsium arvense*), Smooth Brome Grass (*Bromus inermis*), and Common Buckthorn (*Rhamnus cathartica*).[299] If these invasives

[299] EA, Appendix C, Question 19.

spread or are introduced in other sections of the site, seed mixes will have a harder time establishing during site restoration.

Seed Mixes

Coneflower Solar has developed a VMP (Appendix E of the Site Permit Application) that details the planned restoration and revegetation activities for the land control area. The land control area has been divided into 7 different Vegetation Management Units (VMUs) (Table 31). Coneflower Solar has designed four seed mixes for the four VMUs that will require revegetation following construction.

Table 31. Project Vegetation Management Units

	Acres	
Vegetation Management Unit	**MISO Scenario**	**Garvin Scenario**
Array	1,590.0	1,594.5
Perimeter Shortgrass	61.0	61.1
Perimeter Mixed-Height	272.0	274.3
Wet	17.7	17.7
Existing Vegetation to Remain (outside fence)*	301.3	299.1
Existing Public Road*	18.8	18.8
Facility Components*	38.3	33.6
Total	**2,299.1**	**2,299.1**

* Areas planned for facility components or harboring existing vegetation (that will be maintained) or infrastructure will not require revegetation

Seed mixes are designed to meet project goals. Some key principles for seed mix design include adding all functional groups (warm- and cool-season grasses, sedges, rushes, legumes, forbs, etc.) into the mix that would be found in a natural plant community, including species with a variety of successional stages, including multiple blooming species across the seasons to provide benefits to pollinators, and developing seed mixes that are both diverse and contain high enough seeding rates for individual species to allow for establishment.[300] Both the DNR[301] and Commerce[302] have developed guidance specifically focused on prairie vegetation establishment and maintenance for solar projects. High-diversity prairie seed mixes, which contain 20 or more native forb species, are recommended for use as they provide the highest standard of ecosystem services and long-term resilience. The developed

[300] BWSR, *Native Vegetation Establishment and Enhancement Guidelines, Section 2: General Planning Considerations*. Retrieved from: https://bwsr.state.mn.us/sites/default/files/2022-11/New%20format%20Section%202.pdf

[301] DNR, *Prairie Establishment and Maintenance Technical Guidance for Solar Projects*. (Revised February 2025). Retrieved from: https://files.dnr.state.mn.us/publications/ewr/prairie_solar_tech_guidance.pdf

[302] Commerce, *Guidance for Developing a Vegetation Establishment and Management Plan for Solar Facilities*. (March 2021). Retrieved from: https://apps.commerce.state.mn.us/eera/web/project-file/11702

guidance documents define the appropriate overall forb seeding rate for high-diversity solar seed mixes to be at least 40%.

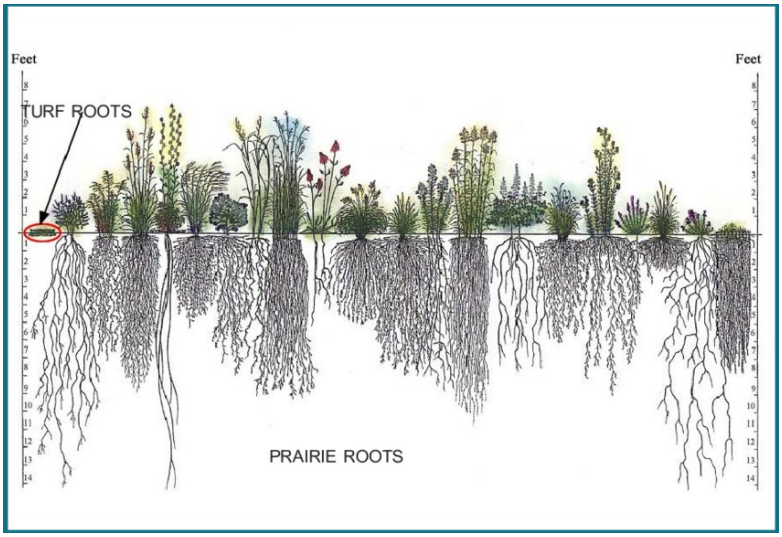
The two perimeter seed mixes proposed in Coneflower Solar's draft VMP meet the high-diversity threshold of at least 20 native forb species. However, these two seed mixes do not meet the overall recommended forb seeding rate of at least 40%.

The array seed mix does not meet the high-diversity threshold of at least 20 native forb species or the overall forb seeding rate of at least 40%. The array seed mix consists primarily of low growth fescue mix (turfgrass) and covers approximately 69% of the project (Figure 40).

If the majority of the project is seeded with the array seed mix, the vegetation community that establishes will have relatively low diversity and provide limited habitat benefits. Turfgrasses are capable of rapid establishment, and the native species in the array seed mix are not known for their competitive ability. Over time, the turfgrass would outcompete the native species and dominate the array VMU, ultimately covering roughly 70% of the land control area. Turfgrass may spread into the surrounding higher-diversity perimeter units, further outcompeting the native vegetation in the project and reducing foraging or nesting habitat.

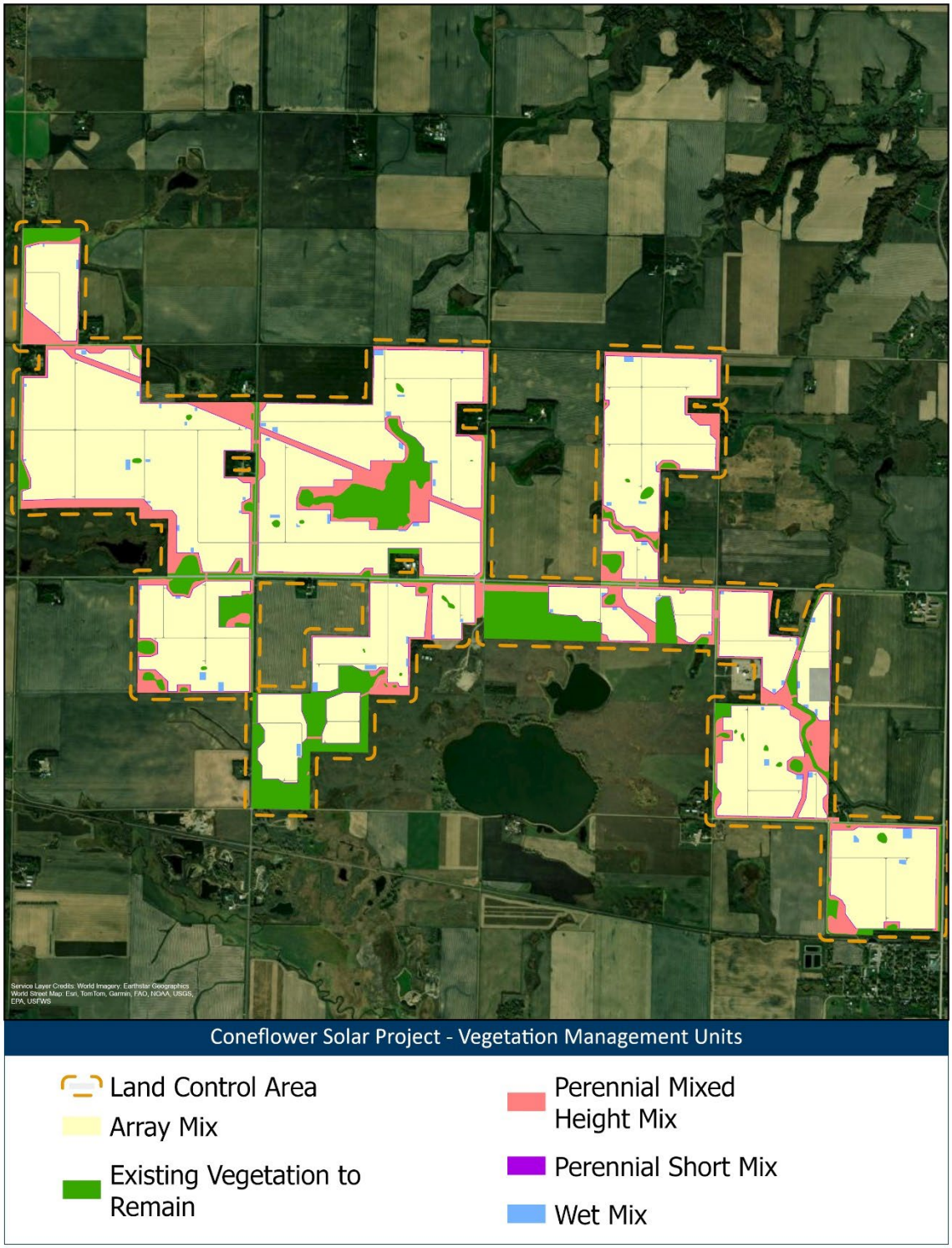
In addition to a lack of habitat benefits, turfgrass does not provide ecosystem services to the extent that native species can. The root systems of turfgrasses are much shallower than the root systems of native prairie plants (Figure 39).[303] Compared to a solar facility with an established native prairie, a solar facility dominated by turfgrass would see reduced root-system soil penetration and water infiltration. Surface runoff can result in sedimentation of surface waters, soil erosion, or alteration of aquatic animal habitat.

Figure 39. Root Systems



[303] MnDOT, *Minnesota Soil Bioengineering Handbook*. (2005). Retrieved from: https://www3.uwsp.edu/cnr-ap/UWEXLakes/PublishingImages/resources/restoration-project/MN%20Soil%20Bioengineering%20Handbook.pdf

Figure 40. VMUs within Project*



*Shown are the VMUs for the Garvin Scenario. There are marginal differences compared to the MISO Scenario VMUs due to the different locations of project interconnecting facilities

Conservation Easements

Construction within the native vegetation areas along the county-proposed flowage easement in the northwestern portion of the project could eliminate vegetative cover, exposing the soil and increasing erosion into the drainage system as well as removing wildlife habitat from the area. Similarly, construction within the large RIM easement in the center of the project would remove a large wetland habitat that supports a variety of wildlife from the area. Disturbance in either easement that results in the loss of native vegetative cover could allow invasives present in the seed bank to rapidly establish and take over.

MITIGATION

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

- Section 4.3.17 requires the permittee to develop a VMP in coordination with state agencies and to file the VMP prior to construction. The applicant has prepared a draft VMP as Appendix E 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 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. Coneflower Solar has included a draft AIMP as Appendix D 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.

Impacts to soil, water, and existing native vegetation could be mitigated by using VMP seed mixes that are consistent with DNR and Commerce guidance, particularly regarding the use of native, deep-rooted perennials.

Prior to transporting to the project, Coneflower Solar will use designated cleaning areas to remove noxious weeds and/or seeds from equipment. The project design avoids the conservation easements along the county-proposed flowage easement and RIM easement within the center of the project. Additionally, Coneflower Solar has designed the project to avoid tree clearing.[304]

No additional mitigation is proposed.

4.7.7 Wildlife and Habitat

The ROI for non-avian terrestrial wildlife and their habitats is the land control area, the ROI for birds is the local vicinity, and the ROI for aquatic wildlife and their habitats is the project area. Potential impacts may be positive or negative and are species dependent. Long-term, positive impacts to small mammals, insects, snakes, etc. would likely occur; impact intensity would depend on the amount and quality of habitat created by the project. 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 as they travel between the surrounding habitat patches. Potential impacts can be mitigated in part through project design and BMPs. The impact intensity level is expected to be **minimal to moderate**.

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 ditches, as well as small pockets of wetlands and trees, provide habitat for terrestrial and avian wildlife. Directly south of the project, the Garvin WMA, Bendix I & II WPAs, and Lake of the Hill provide habitat for terrestrial and aquatic wildlife. Additional wildlife habitat is found directly west of the project in the Sherman WPA, northwest of the project in the Dayland Marsh and Deer Lane WMAs, and in the center of the project in the large RIM Wetland Restoration.

Wildlife utilizing the project area are common resident and migratory 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. Species that may use habitats typical of land cover within the project area include:

- Mammals near agricultural areas such as white-tailed deer, mice, voles, raccoons, mammals nearer to woodland habitats such as bats, and opossum, and mammals such as muskrats possible near wetlands;

[304] SPA, p. 98.

- Reptiles near plant diverse areas or wetlands such as garter and redbelly snakes, turtles, and skinks;
- Amphibians near agricultural, grassland, or wetland areas such as the northern leopard frog and American toads;
- A variety of insects including native bees, butterflies, and moths;
- Bird species near open fields and agricultural areas such as kildeers, pheasants, turkeys, red-tailed hawks, grackles, meadowlarks, bobolinks, horned larks, and American kestrels;
- Waterfowl and shorebirds near wetlands areas such as mallards, Canada geese, and red-winged blackbirds; and
- Common woodland bird species such as cardinals, chickadees, and nuthatches.

The presence of several WMAs, WPAs, and conservation easements both within and directly adjacent to the project represents a greater diversity of habitat for wildlife.

Potential Impacts

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

Terrestrial 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.

Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact wildlife populations. Wildlife entanglement from plastic netting and other plastic materials has been documented in mammals and reptiles and can lead to injuries, such as lacerations or spinal damage, and even result in death due to strangulation or overheating.[305]

The largest impact to wildlife associated with solar facilities is fencing. Fencing can directly impact wildlife, through a physical interaction with the fence, or indirectly impact wildlife, by leading to a behavioral change. These impacts can be positive or negative, depending on the design and purpose of the fence. Potential positive impacts from project fencing are limited, as the fencing is designed to be an exclusion fence meant to protect the solar facility. Exclusion fences are impermeable to medium

[305] Stuart, J.N., Watson, M.L., Brown, T.L., & Eustice, C. (2001). *Plastic netting: An entanglement hazard to snakes and other wildlife*, retrieved from: https://www.researchgate.net/publication/286280488_Plastic_netting_An_entanglement_hazard_to_snakes_and_other_wildlife

and large mammals and semi-permeable to small mammals, birds, and reptiles.[306] Small animals who can move through project fence openings may be protected within facility fences,[307] giving them a safe refuge for shelter or rearing their young.

Potential negative impacts from project fencing are more numerous. Project fencing will be 7 ft-high woven wire fences topped with one-foot of three to four strands of smooth wire,[308] which is below the height recommended by the Minnesota DNR.[309] This may increase the risk of larger wildlife, such as deer, getting stuck within the facility; the presence of project components may hinder wildlife from reaching the speed necessary to clear the fence from the inside. Additionally, 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.[310] Wildlife that collides with fencing can be killed or injured, while those that become entangled may die from starvation or incur greater injuries in attempts to free themselves. Predators can use fences to corner and kill prey species,[311] and young animals that cannot cross fences can be separated from their mothers and die.[312]

Fences can act as barriers that block wildlife movement,[313] interrupt behavior patterns,[314] and prevent them from accessing resources. This can be particularly impactful if fences remove or reduce wildlife travel corridors in fragmented landscapes where wildlife must increase movement between habitat patches to obtain adequate resources.[315] Even small animals may need to move between habitat

[306] Jakes, A.F., Jones, P.F., Paige, L.C., Seidler, R.G., & Huijser, M.P. (2018). *A fence runs through it: A call for greater attention to the influence of fences on wildlife and ecosystems*. DOI: https://doi.org/10.1016/j.biocon.2018.09.026

[307] Brooks, M.L. 1999. *Effect of protective fencing on birds, lizards, and black-tailed hares in the western Mojave Desert.* DOI: 10.1007/s002679900194

[308] SPA, p. 20.

[309] Minnesota DNR. *Commercial Solar Siting Guidance*. (2023). Retrieved from: https://files.dnr.state.mn.us/publications/ewr/commercial_solar_siting_guidance.pdf

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

[311] 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.

[312] Harrington, J.L. & Conover, M.R. (2006). *Characteristics of ungulate behavior and mortality associated with wire fences*, https://doi.org/10.2193/0091-7648(2006)34[1295:COUBAM]2.0.CO;2

[313] Sawyer, H., Kauffman, M.J., Middleton, A.D., Morrison, T.A., Nielson, R.M., & Wyckoff, T.B. (2012). *A framework for understanding semi-permeable barrier effects on migratory ungulates*. https://doi.org/10.1111/1365-2664.12013

[314] Maida, J.R., Bishop, C.A., & Larsen, K.W. (2019). *Migration and disturbance: impact of fencing and development on Western Rattlesnake (Crolatus oreganus) spring movements in British Columbia.* https://doi.org/10.1139/cjz-2019-0110

[315] Marable, K.M., Belant, J.L., Godwin, D., & Wang, G. (2012). *Effects of resource dispersion and site familiarity on movements of translocated wild turkeys on fragmentated landscapes*. https://doi.org/10.1016/j.beproc.2012.06.006

patches in search of food, shelter, and mating opportunities.[316] Fences can also direct wildlife onto roads, increasing both wildlife and motorist fatalities where the ends of fence lines provide openings for road crossings. This "fence-end effect" can displace roadkill locations to road sections at fence end points,[317] creating high risk collision zones. Mobile wildlife that frequently cross roads between habitats experience increased wildlife-vehicle collision risk, and roads in connected landscapes with suitable wildlife habitat are more dangerous.[318]

The impacts of project fencing on animal movement must be considered in context with the project landscape. There is a considerable amount of wildlife habitat both adjacent to and within the project in the form of public lands and conservation easements. Wildlife in the area move between these habitat patches to meet their resource needs. The project is also bisected by US 14, and wildlife must cross this road to move between the habitats in the north and south of the project area. Once project fencing is installed, the travel corridors of medium- and large-sized animals moving between the north and south habitat patches will be limited to the passages between fence lines. According to current project design, the minimum setback between the road ROW and the project fence line is 38 feet, which is narrower than DNR recommendations to minimize disruptions to wildlife travel corridors.[319] Medium- and large-sized animals may face increased vehicle collision risk at fence ends as they attempt to cross US 14 to access habitat.

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, waterfowl, and owls are also vulnerable to fence collisions. The proximity of WPAs adjacent to the project may increase the risk of waterfowl-fence collisions.

Risks to birds have been identified near PV solar facilities. Preliminary findings in one report, based on limited data, suspect a large expansive of dark panels may be reminiscent of a large body of water. Deemed the "Lake Effect Hypothesis", or LEH, the study suggests that migrating birds, confusing the solar facility with a body of water, attempt to land, consequently incurring trauma and related predation.[320] However, a separate study proposes that the LEH is a much more nuanced process; rather than a solar facility providing a signal of a lake to all aquatic birds at all times, only certain aquatic bird species are attracted to solar facilities, and this attraction is likely context-dependent.

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[316] Nordberg, E., Ashley, J., Hoekstra, A., Kirkpatrick, S., & Cobb, V.A. (2021). *Small nature preserves do not adequately support large-ranging snakes: Movement ecology and site fidelity in a fragmented rural landscape.* https://doi.org/10.1016/j.gecco.2021.e01715

[317] Plante, J., Jaeger, J.A.G., & Desrochers, A. (2019). *How do landscape context and fences influence roadkill locations of small and medium-sized mammals?* https://doi.org/10.1016/j.jenvman.2018.10.093

[318] Bénard, A., Lengagne, T., & Bonenfant, C. (2024). *Integration of animal movement into wildlife-vehicle collision models*. https://doi.org/10.1016/j.ecolmodel.2024.110690

[319] DNR, Scoping Comments, December 4th, 2024, eDockets number: 202412-212709-01.

[320] 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

Water-obligate bird species in arid environments that lack water may be most susceptible to this "Lake Effect," as these species rely heavily on aquatic habitat to survive and reproduce.[321]

Overall, utility-scale solar facilities have been found to have avian mortality rates that are notably lower than mortality caused by other human structures, including communication towers, vehicles, and buildings and windows.[322] However, the proximity of solar panels, which waterfowl may confuse with a large body of water, to WPAs may increase waterfowl-panel collision risk. WPAs are important nurseries and breeding habitat for North America's waterfowl, and the presence of a solar facility adjacent to these habitats could result in LEH impacts; the extent of any such impacts is uncertain.

Birds are also susceptible to electrocution from transmission lines. Electrocution is a risk if the conductors or ground wires are close enough together that a bird can touch two conductors simultaneously with its wings or other body parts. Independent of the risk of electrocution, birds might be injured or killed by colliding with transmission line structures and conductors. The risk of collision is influenced by several factors including habitat, flyways, foraging areas, and bird size. Waterfowl, especially larger waterfowl such as swans and geese, are more likely to collide with transmission lines. If the Garvin Scenario is chosen as the final project design, the 345 kV transmission line used for interconnection to the grid may pose a collision risk for waterfowl due to the WPAs in the area. Impacts and mitigation for transmission line-waterfowl collision risks would be addressed in the route permit that would be required for the Garvin Scenario.

Plastic erosion control netting can negatively impact bird populations. Both aquatic and terrestrial birds are susceptible to entanglement, experiencing injury, impaired mobility, and death.[323]

Aquatic Wildlife

There are some aquatic habitats present within the land control area in the form of wetlands, most notably the large wetland RIM easement in the center of the project. In addition, the Lake of the Hill is directly south of the project, three WPAs containing numerous wetlands are adjacent to the project, and drainage systems within project boundaries connect to the Des Moines and Cottonwood River, extending the range of potential impacts. Construction and operation of the facility can create fugitive dust from soil movement or transportation on unpaved roads. Coneflower Solar has indicated they plan to use water or other dust control agents to suppress fugitive dust. Dust control agents used during construction frequently contain chloride, which can persist in the environment and accumulate to toxic levels. Chlorides readily spread through water systems and harm aquatic wildlife. Low

[321] Kosciuch, K., Riser-Espinoza, D., Moqtaderi, C., & Erickson, W. (2021). Aquatic habitat bird occurrences at photovoltaic solar energy development in Southern California, USA. DOI: https://doi.org/10.3390/d13110524

[322] Walston, L., Szoldatits, K., Lagory, K., Smith, K., & Meyers, S. (2016). *A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States*. DOI: https://doi.org/10.1016/j.renene.2016.02.041

[323] Ryan, P. (2018). Entanglement of birds in plastics and other synthetic materials. DOI: https://doi.org/10.1016/j.marpolbul.2018.06.057

concentrations of chloride exposure can impact growth, reproduction, and physiology, while high concentrations can result in death.[324]

Aquatic wildlife can be injured or killed by entanglement in plastic erosion control netting. Additionally, the use of erosion control methods containing plastic, such as plastic erosion control netting or hydro-mulch products with synthetic plastic fibers, can result in macro- or micro-plastic drainage into aquatic systems. Plastic pollution has consequences across aquatic trophic levels; it can be ingested by a variety of aquatic wildlife, impacting their growth and survival.[325]

Malachite green dye is commonly used in hydro-mulch erosion control products, and it can easily drain into aquatic systems. Malachite green dye has a wide range of negative toxicological effects on aquatic wildlife, including, but not limited to, carcinogenesis, mutagenesis, respiratory toxicity, multi-organ tissue injury, and developmental abnormalities.[326]

Nocturnal Wildlife

The presence of facility lighting has the potential to interrupt the daily cycle of light and dark for animals in the project area. Exposure to artificial light at night impacts the physiology, behavior, and survival of a variety of wildlife: restricting their movement, impairing their foraging, inhibiting their communication, and even leading them to their death.[327] Light color can influence the impacts of nighttime artificial light exposure, with blue- and white-rich lighting having greater negative effects on wildlife, particularly to highly sensitive groups such as insects.[328]

Noise Pollution

The noise pollution emitted by human activities can impact the health and behavior of wildlife. Over prolonged periods, extremely high noise levels can physically harm wildlife, while lower noise levels may increase stress or impair wildlife communication, which can impact foraging ability, predator avoidance, and mating success.[329,330]

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[324] Southeastern Wisconsin Regional Planning Commission. 2024. *Impacts of Chloride on Biological Systems.* Retrieved from: https://www.sewrpc.org/SEWRPCFiles/Environment/ChlorideImpactStudy/TR-62-Chapter3PreliminaryDraft.PDF

[325] Ali, N., Khan, M.H., Ali, M., Sidra, Ahmad, S., Khan, A., Nabi, G., Ali, F., & B, M. (2024). *Insight into microplastics in the aquatic ecosystem: Properties, sources, threats, and mitigation strategies.* DOI: 10.1016/j.scitotenv.2023.169489

[326] Srivastava, S., Sinha, R., & Roy, D. (2004). *Toxicological effects of malachite green.* DOI: 10.1016/j.aquatox.2003.09.008

[327] McNaughton, E.J., Beggs, J.R., Gaston, K.J., Jones, D.N., & Stanley, M.C. (2021). *Retrofitting streetlights with LEDs has limited impacts on urban wildlife.* DOI:10.1016/J.BIOCON.2020.108944

[328] Longcore, T., Rodríguez, A., Witherington, B., Penniman, J.F., Herf, L., & Herf, M. (2018). *Rapid assessment of lamp spectrum to quantify ecological effects of light at night*. DOI: 10.1002/jez.2184

[329] Brumm, H., (2010). *Anthropogenic Noise: Implications for Conservation*. DOI: 10.1016/B978-0-08-045337-8.00289-8

[330] Slabbekoorn, H. (2010). *Anthropogenic Noise: Impacts on Animals*. https://doi.org/10.1016/B978-0-08-045337-8.00010-3

The potential impacts of project-generated noise on local wildlife were assessed due to the presence of numerous habitat patches within and around the project. EERA staff note that it is difficult to determine the full extent to which project-generated noise may impact wildlife in the local vicinity. Unlike human residences which are fixed in location as noise receptors, wildlife move throughout their habitat, bringing them closer to or further away from generated noise. Additionally, the noise standards used to evaluate project noise impacts are set with respect to human perception, not wildlife, so the dBA at which each species would be impacted is unknown. Table 32 shows the maximum project noise within the wildlife habitats directly bordering and within the project. Maximum noise was calculated using the dBA levels and sound dissipation rate discussed in Section 4.3.2 (Noise). The noise levels displayed represent the sound character at the location in the habitat closest to project components. As wildlife move further from the project into the habitat patch, noise would continue to dissipate.

Table 32. Maximum Project Noise (dBA) in Wildlife Habitat

	Construction Noise (dBA)		Operation Noise (dBA)	
Habitat Unit	**Pile Driving**	**Other Activities**	**Inverter**	**Tracker**
Garvin WMA	88	73	39	32
Bendix I WPA	87	73	39	32
Bendix II WPA	88	73	36	32
Sherman WPA	88	73	38	33
RIM Easement	101	100	42	46

The highest levels of noise will be generated during project construction, with pile-driving identified as the most significant source of noise. The noise generated by pile-driving during renewable energy project construction has been shown to impact foraging success,[331] deter animals,[332] and alter behavior.[333] While construction noise may reach significant levels, similar to what is anticipated at some surrounding human receptors, any impacts will be short-term, intermittent, and will occur during daylight hours to the extent practicable. Wildlife within the analyzed habitats may be stressed or frightened by construction noise, and it may act as a distracting stimulus when they are foraging or

[331] Jones, I.T., Peyla, J.F., Clark, H., Song, Z., Stanley, J., & Mooney, T. (2021). *Changes in feeding behavior of longfin squid (Doryteuthis pealeii) during laboratory exposure to pile driving noise*. https://doi.org/10.1016/j.marenvres.2020.105250

[332] van der Knaap, I., Slabbekoorn, H., Moens, T., Van den Eynde, D., & Reubens, J. (2022). *Effects of pile driving sound on local movement of free-ranging Atlantic cod in the Belgian North Sea*. https://doi.org/10.1016/j.envpol.2022.118913

[333] Bailey, H., Senior, B., Simmons, D., Rusin, J., Pick, G., & Thompson, P.M. (2010). *Assessing underwater noise levels during pile-driving at an offshore windfarm and its potential effects on marine mammals*. https://doi.org/10.1016/j.marpolbul.2010.01.003

communicating. Mobile wildlife species may avoid certain louder habitat patches during peak construction activity.

Both the trackers and inverters will create noise during the operation of the project. The noise generated by the rotation of the trackers following the sun will be short in duration and intermittent. Wildlife may occasionally be startled by the rotational noise. The primary noise levels during operation of the project derive from the inverters. These levels are expected to be constant throughout the day and sound akin to a humming or buzzing sound. Chronic noise in wildlife habitat may impact wildlife by masking their auditory processing abilities.

Many species of wildlife, including birds and amphibians, use vocalization to identify and attract mates during the breeding season. Others rely upon the sounds emitted by prey to successfully hunt. Noise generated by human activities can increase the level of ambient noise in the soundscape, leading to the "masking" of auditory cues. Increased ambient noise can make it more difficult for breeding animals to identify mating calls, which can reduce their breeding success and impact local populations.[334] The proximity of the project to avian breeding habitat may impact bird breeding success in the sections of habitat closest to the project. Even if the overall intensity of sound produced by the operating inverters is relatively low, the constant ambient noise may impact the ability of birds or other wildlife to recognize mating or warning calls. Several grassland bird species breed within this area,[335] and degradation of available breeding habitat would harm populations.

There is little established data on the dBA ranges at which wildlife species are impacted by ambient noise. Certain acoustically specialized predators, such as owls, appear to be highly sensitive to chronic noise even at low ranges.[336] In general, bird reproductive success does decline in chronically noisy habitats.[337] These trends have been documented in habitats along roadsides and in proximity to other types of energy infrastructure, but thus far there is no research documenting how chronic noise from solar facilities impacts wildlife. The available literature indicates that is not only the intensity of the sound that matters; the frequency can also interfere with wildlife perception. Given the available research on this subject, it is difficult to make any determination about the impacts of facility sound on wildlife.

Habitat

There are no Important Bird Areas (IBA) designated by the National Audubon Society within the land control area; the Prairie Coteau Complex IBA is located approximately 20 miles southwest of the project and encompasses six separate areas within the Prairie Pothole and Eastern Tallgrass Prairie Bird Conservation Regions.[338] There are no Wildlife Management Areas or Waterfowl Production

[334] Id.
[335] SPA, Appendix C, Agency Correspondence.
[336] Mason, J.T., McClure, C.J.W., & Barber, J.R. (2016). *Anthropogenic noise impairs owl hunting behavior*. https://doi.org/10.1016/j.biocon.2016.04.009
[337] Francis, C.D., Ortega, C. P., & Cruz, A. (2009). *Noise Pollution Changes Avian Communities and Species Interactions*. https://doi.org/10.1016/j.cub.2009.06.052
[338] Audubon Minnesota, retrieved from: https://mn.audubon.org/node/4281.

Areas within the project area, although there are several adjacent to the project, and there is on RIM easement within the project.[339]

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 cover and habitat for the life of the project. The extent and quality of this habitat will depend on the relative abundance of perennial native species that provide forage and nesting resources. Fencing will restrict ingress and egress of larger wildlife, and habitat benefits will be limited to small-sized mammals, birds, and reptiles who can successfully cross the fence.

A recent Minnesota study found that utility scale solar habitats with pollinator vegetation increased native bee abundance, resulting in increased pollination visits to bordering agricultural fields.[340] Solar habitat can also enhance bird species richness and diversity in agricultural landscapes,[341] likely because these sites provide beneficial foraging and nesting habitat in a resource-limited landscape. The magnitude of these benefits is determined by the extent of habitat restoration within the solar facility. The conversion of the land control area from annual agricultural production to perennial vegetation will positively impact terrestrial wildlife within the land control area, as well as aquatic wildlife in the Lake of the Hill, surrounding wetlands, and Cottonwood and Des Moines Rivers, by reducing pesticide use.

The VMP anticipates that mowing will be done 1-3 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 weed spread.[342]

Overall, the project does not contribute to significant habitat loss or degradation.

MITIGATION

Several sections of the DSP (**Appendix B**) 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".

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[339] SPA, p. 100.

[340] Walston, L., Hartmann, H., Fox, L., Macknick, J., McCall, J., Janski, J., & Jenkins, L. (2023). *If you build it, will they come? Insect community responses to habitat establishment at solar energy facilities in Minnesota, USA*, retrieved from: https://iopscience.iop.org/article/10.1088/1748-9326/ad0f72

[341] Jarčuška, B., Gálffyoá, M., Schnürmacher, R., Baláź, M., Mišík, M., Repel, M., Fulín, M., Kerestúr, D., Lackovičova, Z., Mojžiš, J., Zámečník, M., Kaňuch, P., & Krištín, A. (2024). *Solar parks can enhance bird diversity in agricultural landscape*. DOI: https://doi.org/10.1016/j.jenvman.2023.119902

[342] SPA, Appendix E: Vegetation Management Plan.

- 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.
- Installing high visibility markers on fences to increase perceptibility for birds and other wildlife.
- Incorporating fencing modifications, such as small openings along the bottom or wildlife escape ramps, that allow wildlife to move in and out of the fenced area.
- Using luminaries with the lowest levels of blue hue, backlight, and glare possible to minimize impacts to nocturnal wildlife.
- Once permanent vegetation is established, restricting mowing from April 15 to August 15 to improve the potential for ground nesting habitat.

The DSP (**Appendix B**) proposes special conditions related to the mitigating impacts to wildlife resulting from the project's adjacency to various roads, proximity to designated wildlife habitat, and connection to the Des Moines and Cottonwood Rivers via site drainage systems:

- Section 5.9 requires the permittee to apply a minimum setback of 50 feet from the perimeter fence to all road ROWs to reduce the risk of vehicle collisions with wildlife.
- Section 5.10 requires the permittee to use motion activated, down-lit, shielded lighting around and within the Project.
- Section 5.11 requires the permittee to use dust suppression agents that do not contain chloride.
- Section 5.12 requires the permittee to use erosion control materials that do not contain plastic or synthetic fibers or malachite green dye.
- Section 5.13 requires the permittee to coordinate with the DNR on the design and use of small- to medium-sized animal permeable fencing around the Project.
- Section 5.14 requires the permittee to coordinate with the DNR on the installation of fence visibility markers in locations determined to pose a collision risk for low-flying birds.

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 alteration or 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 or monarch butterfly.

The 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

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."[343] 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 is 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.

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

POTENTIAL IMPACTS

NATURAL COMMUNITIES

The MBS systematically collects, interprets, and provides baseline data on the distribution and ecology of rare plants, rare animals and native plant communities.[344] The MBS uses four classifications denoting the level of biological diversity to rank sites:[345]

- **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.
- **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 land control area. There are several MBS sites of moderate biodiversity significance adjacent to the project, one is an upland prairie system and prairie wetland complex within the Garvin WMA, and the other is an upland prairie system within the Bendix II WPA.[346]

RARE SPECIES

Northern Long Eared Bat (Myotis septentrionalis)

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. According to the MNDNR and USFWS, there are no known

[344] DNR. *Minnesota County Biological Surveys*, http://www.dnr.state.mn.us/eco/mcbs/index.html
[345] DNR, *Minnesota Biological Survey*, MBS Site Biodiversity Significance Ranks, https://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html.
[346] Minnesota Natural Resource Atlas, retrieved from https://mnatlas.org/gis-tool/.

hibernacula in Lyon County or Murray County, which is the adjacent southern county.[347] 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.[348]

Tricolored Bat (Perimyotis subflavus)

The Tricolored Bat (TCB) is a proposed federally listed species and state listed species of concern. During the winter this species hibernates in caves, mines, and tunnels, and during the active season (approximately April-October) they generally roost singly in trees, rock crevices, and barns, but are also known to roost in their winter hibernaculum. 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. Disturbance to the hibernacula is particularly harmful to juveniles, who's reduced fat stores decrease their chances to survive the winter. According to the MNDNR it has only been found in small numbers in the state and a maternity colony has yet to be found in Minnesota. The preferred mitigation strategy to avoid impacts to the TCB is avoidance of tree-clearing to the extent possible. When tree clearing is necessary, it should be done outside the active TCB season from April 1 to October 31.[349]

Monarch Butterfly (Danaus plexippus)

The monarch butterfly is a federal candidate species (proposed threatened). 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. Monarchs require milkweed plants for the completion of the immature lifecycle.[350] Due to the agricultural landscape, suitable monarch butterfly habitat is generally limited in the land control area. The three non-array native seed mixes designed for the project include at least one milkweed species;[351] once vegetation has been established the project will provide limited foraging habitat for monarchs.

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[347] Minnesota DNR. (2016). *Townships Containing Documented Northern Long-Eared Bat (NLEB) Maternity Roost Trees and/or Hibernacula Entrances in Minnesota*, retrieved from: https://mn.gov/frc/assets/MFRC%20Presentation_May%202016_Update%20on%20the%20Northern%20Long%20eared%20Bat%20in%20MN_tcm1162-495967.pdf

[348] Minnesota DNR. *Rare Species Guide: Northern Long-eared Bat*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC01150

[349] Minnesota DNR. *Rare Species Guide: Tricolored Bat*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC03020

[350] Minnesota DNR, *Monarch Butterfly*. Retrieved from: https://www.dnr.state.mn.us/insects/monarchbutterfly.html

[351] SPA, Appendix E: Vegetation Management Plan.

Bald Eagles (Haliaeetus leucocephalus)

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.[352]

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 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 land control area and the closest suitable nesting habitat is associated with the Cottonwood and Des Moines Rivers, approximately 1 mile northeast and 0.5 miles southwest of the project.[353] 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.

Prairie Mimosa (Desmanthus illinoensis)

Prairie Mimosa is a state listed special concern species endemic to the Midwest and southeastern United States. The primary threat to the species is habitat loss, land conversion, and disruption. In the North Central Glaciated Plains section, populations typically occur on the shores of shallow prairie lakes. Shallow prairie lakes have largely been drained to create farm fields, as a result, they are very few prairie lakes left in a natural condition. Prairie Mimosa is highly sensitive to disruption, and the limited number of natural shallow prairie lakes in the area put it in a precarious position.

Although Prairie Mimosa is a plant of tall grass prairies, it is possible that the remaining populations in Minnesota only survive along lake shores as these areas are refuges from the effects of agriculture. Prairie Mimosa is a long-lived perennial with a large, rapidly developing root system, and seeds are able to germinate easily upon maturity. However, seeds that do not germinate quickly enter dormancy which can only be broken through scarification. Plants flower from June through July, with fruiting running from July through September. This species is rare in its endemic range due to the limited amount of prairie lake habitat available.[354] The probability of species occurrence within the land control area is considered to be low due to the heavy agricultural use and lack of native prairie lake habitat suitable for Prairie Mimosa.

Snow Trillium (Trillium nivale)

Snow Trillium is a state listed special concern species endemic to the southern Minnesota and the northeastern United States. The primary threat to the species is habitat loss, land conversion, and encroachment of non-native and invasive species. In the North Central Glaciated Plains section,

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[352] Minnesota DNR, *Bald Eagles in Summer*. Retrieved from: https://www.dnr.state.mn.us/birds/eagles/summer.html

[353] SPA, p. 92.

[354] Minnesota DNR. *Rare Species Guide: Prairie Mimosa*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDFAB27090

populations typically occur under tree canopies in mesic hardwood or floodplain forests characterized by fine, moist, calcareous soils and proximity to streams. Snow Trillium is a long-lived, perennial spring ephemeral. Individual plants reach sexual maturity at three and live to at least eight years of age. While Snow Trillium does exist in aggregate colonies, clonal development does not appear to be important for the species. Plants flower from April through mid-May, with fruiting running from May through mid-June.

Minnesota is considered a stronghold for Snow Trillium, but many of the largest populations in the state face rapidly expanding residential development or recreational use.[355] The probability of species occurrence within the land control area is considered to be low due to the heavy agricultural use and lack of hardwood forests and proximity to streams that create habitat suitable for Snow Trillium.

Coneflower Solar recently refreshed the project's Information for Planning and Consulting (IPaC) resource list in response to several species status changes that have occurred since the site permit application was filed. Two new federal candidate species are now listed on the project's IPaC report, Suckley's Cuckoo Bumble bee and the Western Regal Fritillary. These two new species are described below. In addition, neither the NLEB nor TCB are included on the recent IPaC list. Coneflower Solar still plans to limit any tree clearing (if necessary) to avoid the active season for both the NLEB and TCB as a best management practice for bats.[356] The project's updated IPaC report is included in **Appendix F**.

Western Regal Fritillary (Argynnis idalia)

The Western Regal Fritillary is a federal candidate species (proposed threatened). The species has suffered catastrophic declines in the eastern half of its range. The Regal Fritillary is faring better in the western half of its range but is considered vulnerable in Minnesota. Kansas is the only state where this species is considered secure. Regal Fritillaries are restricted to native prairie habitats. Adults are observed in both upland prairies and wet prairies, but larval development may be restricted to upland prairie. With less than 1% of Minnesota's native prairie remaining, this limits available habitat to the widely scattered, mostly small fragments of native prairie in the state that are surrounded by agriculture and development. Only a few of these prairie remnants are large enough to maintain persistent populations if the remnant is genetically isolated. It is unlikely that any prairie remnants are large enough to provide a secure future for a genetically isolated population. The Regal Fritillaries survival in Minnesota is dependent upon the concentration of prairie remnants within the flight range of adults that can collectively support large populations. The Regal Fritillary lays eggs in late summer, which hatch into larvae after a few weeks. The larvae enter dormancy until the following spring when they emerge to feed and grow, pupating in June and emerging as adults from mid-June into July. Regal Fritillaries require violet plants for the completion of the immature lifecycle. In Minnesota, the Prairie Bird's-Foot Violet (*Viola palmata* var. *pedatifida*) of upland prairies has been identified as the principal larval host, although Bird's-Foot Violet (*Viola pedate*) is also used in the southeastern portion of the

[355] Minnesota DNR. *Rare Species Guide: Snow Trillium*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMLIL200L0
[356] EA, Appendix C, Question 20.

state.[357] Due to the agricultural landscape, suitable Regal Fritillary habitat is generally limited in the land control area. The three non-array native seed mixes designed for the project do not include violets;[358] once vegetation has been established the project will provide some foraging habitat for adult Regal Fritillaries but not for developing larvae.

Suckley's Cuckoo Bumble Bee (Bombus suckleyi)

Suckley's Cuckoo Bumble Bee is a federal candidate species (proposed endangered). The species has historically occurred across a large geographic area, extending from northwestern North America to the Great Plains and Midwest all the way to eastern Canada. This species is a social parasite of other bumble bee species including the Western Bumble Bee (*Bombus occidentalis*), the Red-Belted Bumble Bee (*Bombus rufocinctus*), and the White-Shouldered Bumblebee (*Bombus appositus*). Females of the species enter the established nests of other bumble bee species, kill or subdue the queen, and recruit the workers into raising her own offspring. As females of this species do not collect pollen or build nests to provide for their offspring, populations depend upon the presence of the host bumble bee species. Suckley's Cuckoo Bumble Bee is rare in Minnesota, and the species has experienced rapid declines in abundance in recent years, likely due to population declines of their host bumble bee species.[359] Due to the agricultural landscape, suitable bumble bee habitat is generally limited in the land control area. The three non-array native seed mixes designed for the project include a variety of forb species;[360] once vegetation has been established the project will provide foraging habitat for bumble bees. If the project supports populations of host bumble bee species, it could also support populations of Suckley's Cuckoo Bumble Bee.

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.

Section 5.15 of the DSP requires the permittee to comply with the USFWS guidance in effect regarding NLEB, including tree clearing restrictions if applicable.

No additional mitigation is proposed.

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

[357] Minnesota DNR, *Regal Fritillary Butterfly*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEPJ6040
[358] SPA, Appendix E: Vegetation Management Plan.
[359] Washington Department of Fish & Wildlife, *Suckley's Cuckoo Bumble Bee*. Retrieved from: https://wdfw.wa.gov/species-habitats/species/bombus-suckleyi#conservation
[360] SPA, Appendix E: Vegetation Management Plan.

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 increased 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 (GHS) 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%.[361] 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.[362]

Potential Impacts

General

The MNDNR Minnesota Climate Explorer Tool was used to determine current climate conditions for Lyon County. Annual average temperature trends show a temperature increase of 0.18 °F per decade from 1895 to the present, and 0.43 °F per decade from 1970 to present. For precipitation, total annual precipitation has increased at a rate of 0.37 inches per decade from 1895 to present, and a rate of 0.81 inches per decade from 1970 to present.[363]

The MNDNR Minnesota Climate Explorer tool was also used to project climate conditions for Lyon 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.[364]

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

[362] Id.

[363] Minnesota Climate Explorer, retrieved from: https://arcgis.dnr.state.mn.us/climateexplorer/main/historical

[364] 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 Lyon County is projected to increase by approximately 3°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 10°F for RCP 8.5. Mid-Century annual precipitation is projected to increase by approximately one-quarter inch for RCP 4.5. Late-Century annual precipitation is projected to increase by approximately one inch for RCP 4.5, and four inches for RCP 8.5.[365]

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 estimated to be 9,454.0 metric tons of CO_2.[366] The GHG emissions from construction are an insignificant amount relative to Minnesota's overall emissions of approximately 137 million tons in 2020.[367] Potential impacts due to construction GHG emissions are anticipated to be negligible.

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 operation are estimated to be approximately 23.7 metric tons of CO_2 annually. Emissions are comprised of CO_2 from mobile combustion.[368]

It is estimated that the project will offset approximately 391,657 short tons of CO_2 annually.[369] 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.

Coneflower 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 3.9 to 15.3 percent in 2035, and 7.5 to 29.8 percent in 2060 for the project area.[370] Because of this,

[365] Minnesota Climate Trends Map, retrieved from: https://arcgis.dnr.state.mn.us/ewr/climatetrends/
[366] SPA, Appendix I: GHG Worksheet.
[367] MPCA, *Greenhouse gas emissions data.* https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory
[368] SPA, Appendix I: GHG Worksheet.
[369] SPA, p. 79.
[370] SPA, p. 81.

there is potential for waterways to be subject to more erosion. Periods of drought may also be possible. The EPA Streamflow Projections Map anticipates a change in average streamflow of the Cottonwood and Des Moines Rivers by a ratio of 1.20 and 1.28 (90th percentile), respectively, under wetter conditions, and a ratio of 0.98 and 0.96 (10th percentile), respectively under drier conditions from 2071 to 2100 (RCP 8.5) compared to baseline historical flow (1976 to 2005).[371] Because the rivers are located approximately 1 mile northeast (Cottonwood River) and 0.5 miles southwest (Des Moines River) 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. 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. Coneflower Solar will design stormwater ponds in compliance with state and county requirements for reducing runoff rates, and the location's existing drainage patterns will be maintained. The proposed array seed mix will not significantly reduce runoff once established to the extent that a high-diversity native prairie seed mix could, as turfgrass systems have lower water infiltration rates than native prairie systems.[372]

The FEMA National Risk Index[373] rates Lyon County as having "relatively low" risk for hail and a "relatively moderate" risk for strong winds and ice storms. Coneflower Solar has designed the project to withstand wind speeds up to 150 miles per hour and can operate in temperatures ranging to -40°F to 185F. The tracking systems will be designed to withstand wind, snow, and seismic loads anticipated on site and will include standard safety features known as "stowing," the rotation of panels to an angle that best protects equipment from damage during extreme weather or reduces the degree of load on the structures.[374]

In the event of an extreme damage scenario due to severe weather, Coneflower Solar would be financially responsible for repairs. Repairs would be conducted safely by appropriately licensed personnel, by first isolating and deenergizing any operating panels around the impacted area. Replacement racks and arrays would be installed in the impacted area as described in Section 2.1.4. Once repairs are completed, components would be tested and commissioned before returning to full operations.[375]

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[371] US EPA, *Streamflow Projections Map*, retrieved from: https://epa.maps.arcgis.com/apps/MapSeries/index.html?appid=48dcf8ca136a49a298a60e31422d58f0

[372] Selbig, W.R., and Balster, N. (2010). Evaluation of turf-grass and prairie-vegetated rain gardens in a clay and sand soil, Madison, Wisconsin, water years 2004-2008, retrieved from: https://pubs.usgs.gov/sir/2010/5077/

[373] FEMA National Risk Index. https://hazards.fema.gov/nri/

[374] SPA, pp. 81-82.

[375] EA, Appendix C, Question 18.

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.

Coneflower 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 increase in 100-year storm intensity. Appropriate permits would be obtained prior to appropriating water during construction or operation, if needed.[376]

4.8 Electrical System Reliability

The proposed project will generate up to 235 MW, enough to power approximately 49,00 homes per year.[377]

The project has been designed to minimize outages or interruptions to electrical service: SCADA equipment will be used to monitor facility operations 24/7, identify problems, and create preventative maintenance schedules to reduce the chance of equipment failure that results in service outages. The local operations and maintenance team will be supported by the remote monitoring team (Section 2.1.5). Project components are designed to withstand extreme weather events (Section 4.7.9), and the tracking system allows the panels to follow the sun throughout the day, maximizing energy generation (Section 2.1.3).

The proposed project location is ideal for solar energy generation. The region receives a high degree of solar irradiance (Figure 29), and the flat terrain and lack of trees or tall structures means there is little potential for panel shading that impacts generation (Section 4.2). The proximity of the proposed solar facility to the Lyon County to Lake Yankton 115 kV transmission line and the proposed 345 kV

[376] SPA, p. 84.
[377] SPA, p. 1.

Garvin Substation minimizes power loss over long transmission distances,[378] as only a short gen-tie line will be needed to interconnect to the grid in either scenario.

Solar panels can generate electricity from both direct and diffuse, or indirect, solar radiation.[379] Diffuse solar radiation is sunlight that is absorbed, scattered, or reflected by atmospheric components such clouds.[380] Even on cloudy days, the proposed project will generate electricity to supply to the grid. The rotational tracking system allows panels to track the sun's position during winter, when the sun is at a lower angle in the sky, and panels can be rotated to prevent snow from building up on the panel surface.

The proposed project has been planned, sited, and designed to allow for reliable energy generation.

4.9 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.

[378] U.S. Department of Energy. *How It Works: Electric Transmission & Distribution and Protective Measures*. 2023. Retrieved from: https://www.energy.gov/sites/default/files/2023-11/FINAL_CESER%20Electricity%20Grid%20Backgrounder_508.pdf

[379] Kirn, B. & Topic, M. (2017). *Diffuse and direct light solar spectra modeling in PV module performance rating.* DOI: https://doi.org/10.1016/j.solener.2017.04.047

[380] U.S. Department of Energy. *Solar Radiation Basics*. (n.d). Retrieved from: https://www.energy.gov/eere/solar/solar-radiation-basics

- Minor GHG emissions from construction equipment 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 wildlife from fencing.
- Potential decrease to property values.

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

4.11 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.

4.11.1 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.

4.11.2 Communications

Electronic interference from the proposed project is not anticipated. The project area is served by 16 AM radio stations, 20 FM radio stations,[381] and 3 digital television channels.[382] 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 the land control area; the closest cell tower is approximately 6 miles east of the project area near the City of Tracy.[383] Cellular phone service in the service area is provided by national operators.[384] There are no ARMER towers, used for improving communication for emergency operators, in the project. The nearest ARMER tower is located in the City of Marshall, approximately 6.6 miles northwest of the project.[385]

Because the solar facilities are relatively low (less than 20 feet tall), they are well below the line of sight 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.

4.11.3 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.

4.11.4 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.

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[381] Theodric Technologies, LLC. Radio-Locator. [Online]. [Cited March 12, 2025]. Retrieved from: https://radio-locator.com/cgi-bin/locate?select=city&city=5&x=15&y=5

[382] Federal Communications Commission. DTV Reception Maps. [Online]. [Cited March 12, 2025]. Retrieved from: https://www.fcc.gov/media/engineering/dtvmaps

[383] SCADACore. United States Cell Tower Map. [Online]. [Cited March 12, 2025]. Retrieved from: https://www.scadacore.com/tools/rf-path/cell-tower-map-united-states/

[384] Federal Communications Commission. National Broadband Map. [Online]. [Cited March 12, 2025]. Retrieved from: https://broadbandmap.fcc.gov/location-summary/mobile?version=jun2024&lon=-95.800983&lat=44.227964&addr_full=44.227964%2C+-95.800983&zoom=15.58&env=0&tech=tech4g

[385] SPA, p. 59.

4.11.5 Topography

While grading will occur, significant impacts to topography, such as the creation of abrupt elevation changes or modifications to natural drainage patterns, are not expected. Project components will be constructed at grade to the extent possible. Appropriate permanent stormwater management measures will address drainage from the newly established impervious areas. Impacts to topography will be negligible.

4.12 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.

4.12.1 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."[386] 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.

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

Coneflower Solar reviewed the Lyon County and MnDOT websites, along with the Environmental Quality Board's interactive project database[387] and the MISO queue[388] to identify foreseeable projects. Additionally, EERA staff analyzed the unit's active project dockets to identify additional foreseeable projects. Foreseeable projects are identified in Table 33.

Cumulative effects are discussed here for projects that are 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.

Table 33. Current and Reasonably Foreseeable Future Projects

Project	Location	Anticipated Timeframe	Description
Lyon County – County Ditch 29	Lyon County, within and surrounding the southwestern portion of the project	2026-?	Repair and replacement
MnDOT – Hwy 59	Lyon County, north of the project and the City of Marshall	2026	Culvert replacement
MnDOT – Hwy 75 and 14	Lincoln County, west of the project from the Lyon County line to the City of Lake Benton	2027	Resurfacing (Hwy 14), reconstruction (Hwy 75), and infrastructure and utility replacement
Northern States Power Company Wind Project	Lyon County, directly west of the project between the Cities of Balaton and Florence	2027	165 MW wind generation project submitted to the MISO interconnection queue (#J3020) with the Lake Yankton to Buffalo Ridge 115 kV line as the POI
Missouri River Energy Services – Transmission	Lyon County, northwest of the project and the City of Marshall	2028	250 MW wind generation project submitted to the MISO interconnection queue (#J3326/J3346) with the Lyon County to Brookins County 345 kV line as the POI
Xcel Energy – Minnesota Energy	Lyon County to Sherburne County,	2025-2031	345 kV transmission line application submitted to the Commission, project under

[387] Minnesota EQB. Environmental Review Projects Database & Interactive Map. (n.d.). Retrieved from: https://www.eqb.state.mn.us/environmental-review/environmental-review-data

[388] MISO. Generation Interconnection Queue Database & Interactive Map. (n.d.). Retrieved from: https://www.misoenergy.org/planning/resource-utilization/GI_Queue/

Connection	proposed Garvin substation directly east of the project across Hwy 59		review
Xcel Energy – Lyon County Station	Lyon County, directly east of the project across Hwy 59	2026-2027	420 MW natural gas combustion turbine generator capacity and associated facilities

There are two future projects within the environmentally relevant area that are likely to have result in cumulative potential impacts for the city of Garvin, Minnesota Energy Connection (MNEC) and the Lyon County Station (LCS). Xcel Energy has applied for a Route Permit (MNEC Project) to construct a 345 kilovolt (kV) connection between the existing Sherburne County Generation Station Substation in Becker, Minnesota, and a new substation near the city of Garvin.[389] This new substation will be the POI for the Coneflower Solar project if the Garvin Scenario is pursued (the "Proposed Garvin Substation"). Xcel Energy has also applied for approval (LCS Project) to construct 420 MW of combustion turbine generator capacity and associated facilities. This turbine generator and associated facilities is proposed to be located adjacent to the Proposed Garvin Substation,[390] the POI for Coneflower Solar's Garvin Scenario. Unless otherwise indicated, the described project components and potential impacts are sourced from MNEC's Route Permit Application[391] and Environmental Impact Statement[392] and LCS's Competitive Resource Acquisition Proposal.[393]

If Coneflower Solar, MNEC, and LCS are all permitted, the landscape surrounding the city of Garvin will experience dramatic change (Figure 41). This area, currently primarily used for agricultural production, would house:

- The 1,723-acre Coneflower Solar project;
- The 345 kV gen-tie line connecting the Coneflower Solar project to the Proposed Garvin Substation;
- The 40-acre Proposed Garvin Substation endpoint of the MNEC project;

[389] Xcel Energy. Minnesota Energy Connection: https://www.xcelenergytransmission.com/projects/mn-energy-connection/

[390] Xcel Energy. Lyon County Generating Station Proposal: https://www.edockets.state.mn.us/documents/%7BE013338D-0000-C01C-9D50-7115D773FE8E%7D/download?contentSequence=0&rowIndex=286

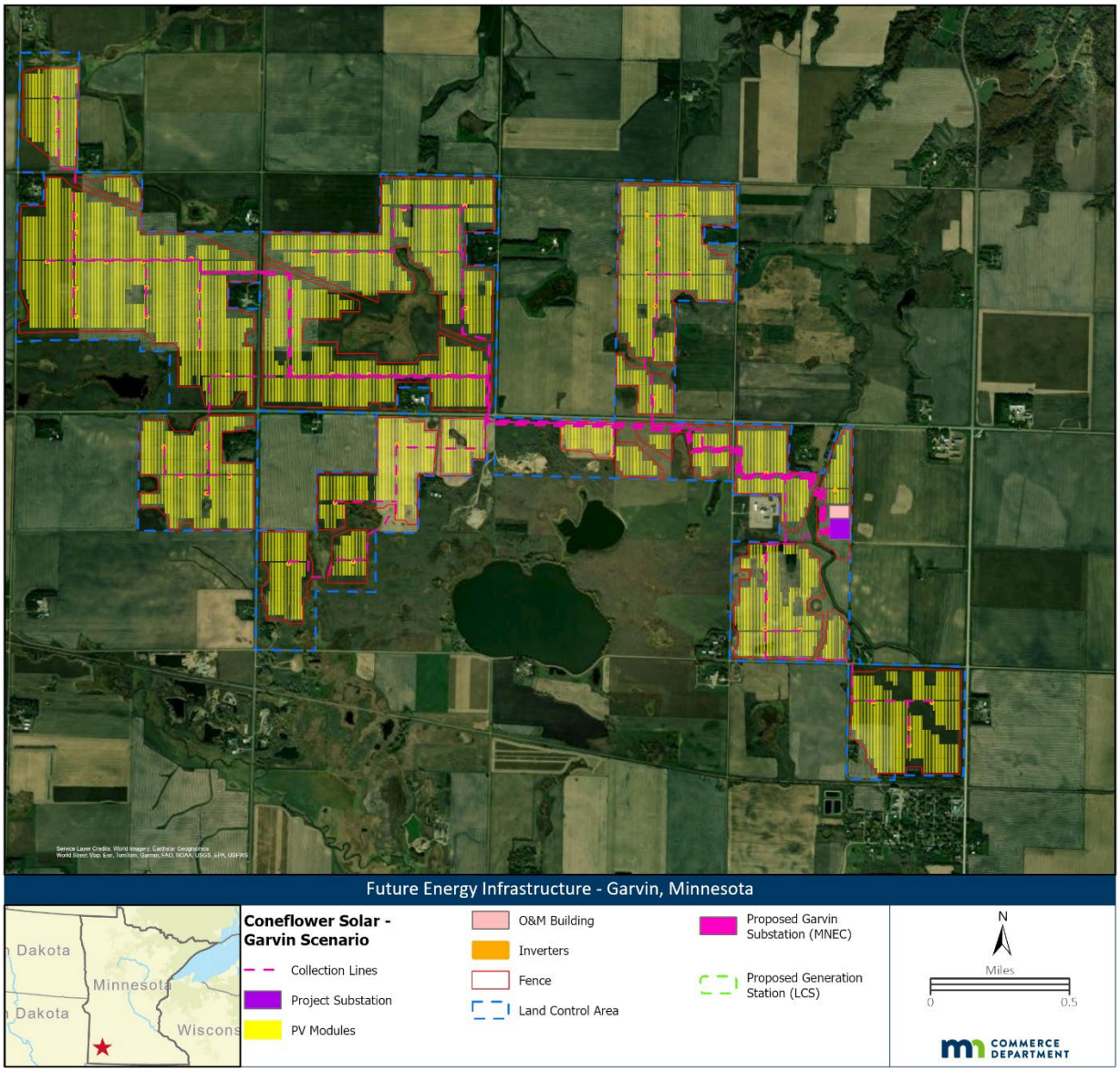
[391] Northern States Power Company, Xcel Energy, Application to the Minnesota Public Utilities Commission for a Route Permit for the Minnesota Energy Connection Project, October 30th, 2023, Docket Number: E002/22-132.

[392] DOC EERA, Final Environmental Impact Statement, Minnesota Energy Connection, January 22nd, 2025, eDockets number: 20251-214220-01 (through 13).

[393] Xcel Energy. Lyon County Generating Station Proposal: https://www.edockets.state.mn.us/documents/%7BE013338D-0000-C01C-9D50-7115D773FE8E%7D/download?contentSequence=0&rowIndex=286

- The double circuit 345 kV transmission line that ends the MNEC route at the Proposed Garvin Substation;
- Two natural gas F-class turbine generators for the LCS project;
- Two 345 kV transmission lines to connect the LCS project to MNEC's Proposed Garvin Substation;
- Various other facilities associated with the projects including on-site operation facilities, emergency diesel generators, and a natural gas metering and pressure regulating station.

Figure 41. Future Garvin Area Infrastructure



Cumulative effects are discussed here for MNEC and LCS. The proposed construction start date for MNEC is in the third quarter of 2025, and the proposed construction start date for LCS is in the second quarter of 2026. Construction schedules are likely to overlap; if they do, potential cumulative impacts include increased noise levels and traffic delays and reroutes. It is assumed that the majority construction-related impacts of these projects are short-term. The discussion here is focused on the potential long-term impacts of these projects, thus, this section largely focuses on operational impacts, with a few longer-term construction-related impacts included.

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.

4.12.2 Human Settlement

Cumulative potential effects on human settlements are anticipated to be minimal to moderate, with increased potential for some significant impacts, depending on viewer sensitivity and distance to the projects, such as a neighboring landowner.

AESTHETICS

The Coneflower Solar project, MNEC, and LCS will all result in aesthetic impacts (Section 4.3.1). Multiple new high-voltage transmission lines, the solar facility, the new substation, and the turbine and associated facilities will introduce several new visual elements into the landscape. Thus, aesthetic impacts will increase in the project area as a result of these future projects. The concentrated area in which these projects are proposed to be constructed will significantly alter the current landscape and may cause dramatic changes in the viewshed at certain vantage points.

SOCIOECONOMICS

While construction of the Coneflower Solar project, MNEC, and LCS will generate construction related jobs, the projects are not anticipated to create significant numbers of long-term jobs (Section 4.3.8). The increase in energy projects in the area may increase tension in the project area between renewable energy and rural character. These tensions may increase in Garvin due to the siting of three large energy projects in direct proximity to one another.

NOISE

Construction of the projects will create increased noise, through vehicle activity and construction. Once operational, noise from the Coneflower Solar Project is anticipated to be negligible (Section 4.3.2); noise coming from the inverters, transformer, and tracking system will dissipate, falling well below L_{50} dBA standards at the nearest resident. Operational noise from MNEC is largely anticipated to be transformer or shunt reactor “hum.” The substation has been designed so that any produced noise does not reach beyond the properties, making the project in compliance with state noise standards. LCS has been designed to meet state noise standards and plans on adding noise-mitigating measures to facilities such as exhaust stack acoustic silencers. Each individual project has modeled their construction and operational noise levels. The resulting sound environment from all three projects combined does not appear to have been estimated. There is potential for additive noise to result in increased cumulative noise impacts.

PROPERTY VALUES

Property values may be affected at homes within 0.5 miles of the Coneflower Solar project compared to homes 2-4 miles away, with a potential reduction in home sale prices of approximately 4% (Section 4.3.5). MNEC may negatively impact property values depending on how the transmission line and substation affects property aesthetics and if potential buyers have concerns over EMF. LCS may similarly impact property values depending on how the transmission lines and turbine generators affect property aesthetics and if potential buyers have concerns over natural gas combustion. Residences within the local vicinity might see some combination of the solar facility, the multiple transmission lines, the new substation, the combustion turbines, and various other facilities in their viewsheds. The overall impact intensity level is anticipated to dissipate with distance. Because of the uncertainty associated with property value impacts, potential impacts to specific properties could be moderate to significant.

CULTURAL VALUES

Garvin is a small city, currently estimated to have a population of 125 people, in a quiet, rural location. The construction and operation of three large energy projects will undoubtedly change the character of Garvin and impact residents' sense of place. The intensity of this impact is extremely difficult to assess, as each individual in the area has their own opinions and ideas that influence their sense of place. Although the impact intensity cannot be explicitly determined, moderate impacts to cultural values are expected. Some residents of Garvin will likely experience significant impacts to cultural values. These impacts are unavoidable, but can be mitigated.

4.12.3 Public Health and Safety

Cumulative potential effects on public health and safety are generally anticipated to be negligible to minimal. There is potential for moderate impacts, but standard permit conditions and anticipated project design make this unlikely.

ELECTROMAGNETIC FIELDS

EMF generated by the Coneflower Solar project is not anticipated to negatively impact human health (Section 4.4.2). MNEC will be constructed to maintain proper safety clearances, and negative impacts to human health from EMF exposure is not anticipated. The overall impact intensity is anticipated to be negligible to minimal. It is noted that transmission lines can induced voltage on a parallel distribution circuit that is directly underneath the transmission line. This includes insulated electric fences used in livestock operation, which can be instantly charged via an induced voltage from a transmission line. These three projects will each have high-voltage transmission lines associated with their operation. This increases the potential for induced voltage to occur.

4.12.4 Land-based Economies

Cumulative potential effects on land-based economies are anticipated to be minimal.

AGRICULTURE

The loss of agricultural land from the Coneflower Solar project will be mitigated by lease payments (Section 4.5.1). Any loss of agricultural land from MNEC and LCS will be similarly mitigated through lease payments, purchase, or easement, depending upon the specific location. The overall impact intensity is anticipated to be minimal.

4.12.5 Archaeological and Historical Resources

Because archaeological resources are unidentified, cumulative potential effects are unknown. With proper mitigation measures, such as the Unanticipated Discoveries Plan required in Special Condition, impacts to these resources can be minimized.

4.12.6 Natural Resources

Cumulative potential effects on the natural environment are anticipated to be minimal to moderate.

AIR QUALITY

The Coneflower Solar project will generate negligible fugitive dust and exhaust emissions during operation (Section 4.7.1). The MNEC project will produce minimal amounts of ozone and nitrous oxide. The LCS project, which will conduct natural gas combustion during project operation, will produce various air pollutants include nitrogen oxides, carbon monoxide, volatile organic compounds, and particulate matter. The LCS project will submit an air emissions permit and comply with environmental regulations for the life of the project. As only the LCS project is anticipated to emit pollutants, overall impact intensity level from these projects is expected to be negligible to minimal.

WILDLIFE

Components of the Coneflower Solar project such as PV panels and fencing will create a collision, entanglement, and funneling risk for wildlife (Section 4.7.7). Transmission line structures and the substation from the MNEC project present a collision or electrocution risk for birds or wildlife who enter the premises. The transmission lines associated with LCS pose a similar collision or electrocution risk for birds. The combined increase in transmission infrastructure within the project area may result in cumulative impacts to wildlife, specifically birds. The presence of multiple Waterfowl Production Areas around these projects will entice migratory and non-migratory birds alike to the attractive nesting and breeding habitat. These birds will face increased collision risk as additional transmission structures are constructed. The overall impact intensity level is anticipated to remain minimal to moderate. The potential for increased cumulative impacts can be avoided if all three projects adopt wildlife-impact mitigation measures where applicable in the project's design.

4.12.7 Rare and Unique Resources

Cumulative potential effects on rare and unique natural resources are uncertain and difficult to determine. The most likely cumulative potential effects would be increased collision or electrocution risk for birds that are federally or state listed as endangered, threatened, proposed threatened, or of conservation concern. If rare bird species are drawn to the avian habitat throughout the area, they will have to navigate multiple transmission structures.

MITIGATION

The city of Garvin will experience a significant amount of infrastructure development in their small town. These proposed projects will alter the surrounding landscape and impact their sense of place. A benefits agreement, as discussed in Section 4.3.3, could lessen the impacts of these three infrastructure projects on residents. A benefits agreement can allow for specific mitigation of the impacts that an individual community values the most. Here, specific mitigation methods would be determined by what the residents of Garvin and Custer Township value most about their community, whether that be the conservation of outdoor recreational resources or the preservation of farm life for future generations. Benefits agreements recognize that each community has its own unique values

and culture, created by the people who live there, and allow for more targeted mitigation to lessen project impacts.

Section 5.16 of the DSP is a special condition that requires the permittee to enter into a Community Impact Mitigation Agreement with the city of Garvin and Custer Township that mitigates impacts to the community of Garvin.

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