Environmental Assessment:

Sherco Solar 3 Project

Human and Environmental Impacts of Constructing and Operating the

250 MW Sherco Solar 3 Project

April 2024

PUC Docket Nos. E002/ GS-23-217

OAH Docket No. 24-2500-39813

COMMERCE DEPARTMENT

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Northern States Power Company d/b/a Xcel Energy (Xcel Energy) proposes to construct, own, and operate a 250-megawatt solar energy generating system and associated facilities in Sherburne County, Minnesota. Xcel Energy must obtain a site permit from the Minnesota Public Utilities Commission before it can construct the proposed Sherco Solar 3 Project.

Sources

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

Project Mailing List

To place your name on the project mailing list contact docketing.puc@state.mn.us or (651) 201-2204 and provide the docket number (23-217,), your name, email address, and mailing address. Please indicate whether you would like to receive notices by email or U.S. mail.

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Acronyms and Abbreviations

Acronym/Abbreviation	Description
AC	alternating current
AIMP	Agricultural Impact Mitigation Plan
ALJ	administrative law judge
applicant	Xcel Energy
BMP	best management practice
BWSR	Board of Water and Soil Resources
Commerce	Department of Commerce
Commission	Public Utilities Commission
CSW Permit	Construction Stormwater Permit
dBA	A-weighted sound level recorded in units of decibels
DC	direct current
DNR	Department of Natural Resources
DSP	draft site permit
EA	environmental assessment
EMF	electromagnetic fields
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
kV	kilovolt
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MW	megawatt
MWh	megawatt hour
mG	milligauss
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MWI	Minnesota Well Index
NAC	noise area classification
NHIS	Natural Heritage Information System
NLEB	Northern Long Eared Bat
NWI	National Wetland Inventory
project	Sherco Solar 3 Project
PV	photovoltaic
ROI	region of influence
ROW	right-of-way
SCADA	supervisory control and data acquisition
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

VMP	Vegetation Management Plan
WCA	Wetland Conservation Act
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area

DEFINITIONS

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

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

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

distribution line means power lines that operate below 69 kilovolts.

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

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

land control area means the 1,780-acre area for which Xcel Energy is assumed to have site control through ownership, a lease agreement, or an easement. The site permit application refers to this as the "Project Area." For this document, it applies to both the area for the solar facility and the final ROW for the collection corridors. 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 1,303-acre area within the land control area where Xcel Energy proposes to build the solar facilities. This area does not include the collection corridors or required setbacks. The site permit application refers to this as the "Buildable Area."

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

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

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

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

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1 Introduction

Xcel Energy (applicant) must obtain a site permit from the Minnesota Public Utilities Commission (Commission) before it can construct the proposed 250 megawatt (MW) Alternative Current (AC) Sherco Solar 3 Project (project). The project would interconnect to the electrical grid at Xcel Energy's Sherco Solar West Substation. The Sherco West Substation was permitted by the Commission in Docket E-002//TL-21-189 and was under construction at the time this document was prepared.

The applicant filed a site permit application (application) on August 8, 2023, and the Commission found the application to be substantially complete on October 23, 2022.

The Minnesota Department of Commerce (Commerce) 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.[1] 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 January 24, 2024, scoping decision (**Appendix A**)

- **Chapter 1** briefly describes the state of Minnesota's role; discusses how this EA is organized; and provides a summary of potential impacts and mitigation.
- **Chapter 2** describes the project—design, construction, operation, and decommissioning.
- **Chapter 3** summarizes the regulatory framework, including the site permit process, the environmental review process, other approvals that might be required for the project, and the criteria the Commission uses to make its decisions.
- **Chapter 4** describes the environmental setting; details potential human and environmental impacts from the Sherco Solar 3 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] Minnesota Statutes 216E.02, subd. 1.

1.2 What does the applicant propose to construct?

Xcel Energy proposes to construct a 250-megawatt solar energy generating system and associated facilities on a site of approximately 1,780 acres in Clear Lake Township and a portion of the city of Clear Lake in Sherburne County, Minnesota.

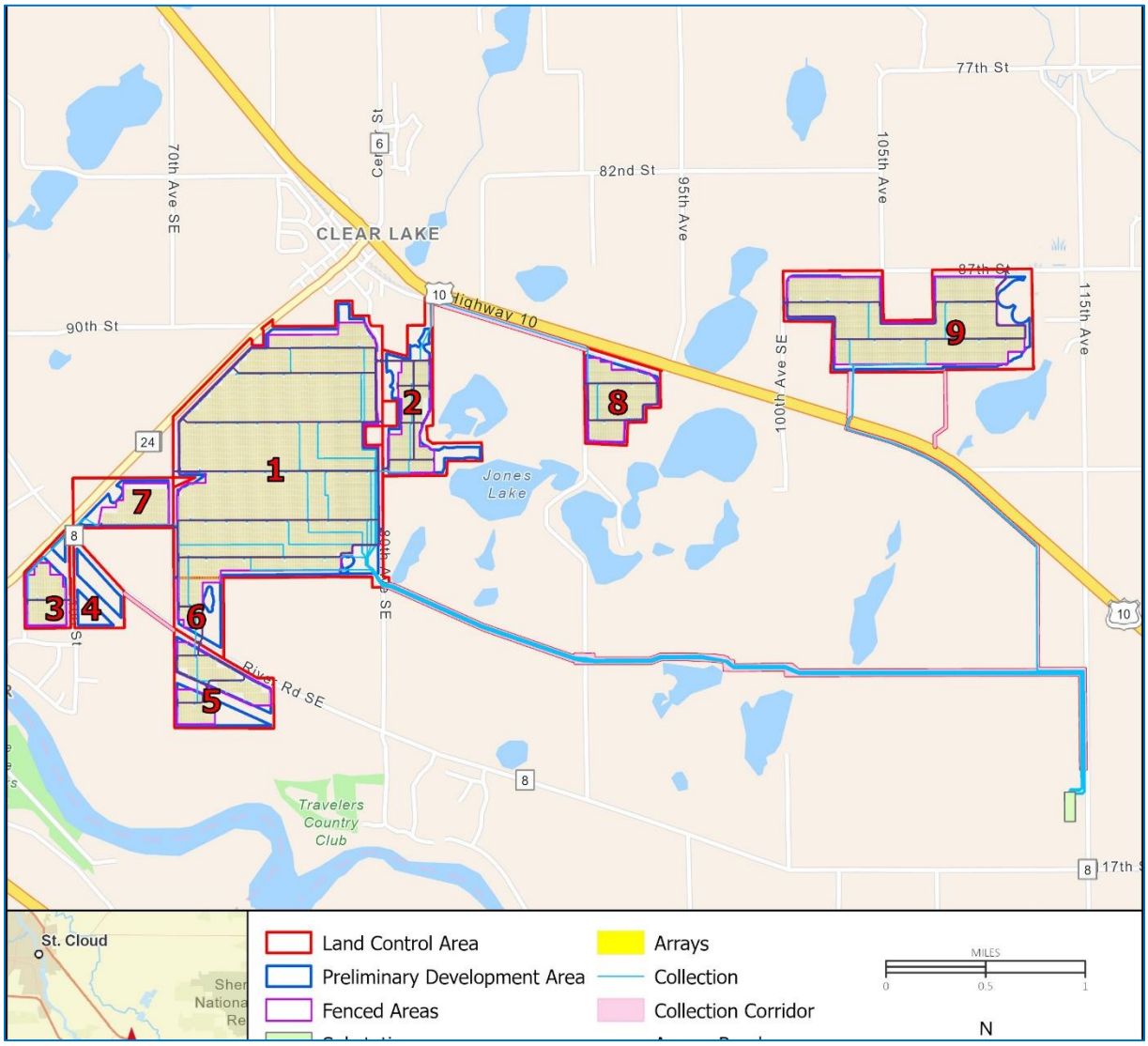
The Project (Figure 1). will consist of photovoltaic (PV) panels, trackers, inverters, transformers, access roads, security fencing, above-ground and below-ground electric collection and communication lines, up to eight weather stations. Xcel Energy proposes to locate the solar facilities in nine units totaling approximately 1,680 acres for which it has lease options[2]. Based on preliminary design, Xcel Energy anticipates approximately 1,303 acres within the 1,680-acre site will be developed for the solar facilities. The solar facilities will be connected to the Sherco Solar West Block Collector Substation via below-ground 34.5 kilovolts (kV) electric collection and communication lines along six corridors. Depending upon final project design, the total collector corridor length is anticipated to be 8 – 8.5 miles. The collection corridors comprise approximately 100 acres for which Xcel Energy has secured or is seeking easements with landowners.

Xcel Energy is proposing the project to partially replace the energy generated by its 710 MW Sherco Generating Plant Unit 2 coal generating facility, which ceased operations in 2023.

Xcel Energy anticipates construction will begin in late 2024 and the project will begin operation by the end of 2025.

[2] Since the site application was filed, Xcel Energy has indicated to EERA staff that it will not develop Unit 4. Xcel Energy indicates that it will file more information on the proposed change in the record prior to the hearing. Because details of the modification were not available at the time this document was prepared, the document describes the project and its potential impacts based on the project design presented in the site permit application.

Figure 1. Proposed Sherco 3 Solar Project



1.3 What is the state of Minnesota's role?

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

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

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

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

Xcel Energy applied to the Commission for a site permit for the project on August 8, 2023.[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 was prepared, and a public hearing will be held. The goal of the EA is to describe potential human and environmental impacts of the project (*the facts*), whereas the intent of the public hearing is to allow interested persons the opportunity to advocate, question, and debate what the Commission should decide about the project (*what the facts mean*). The record developed during this process—including all public input—will be considered by the Commission when it makes its decisions on the applicant's site permit application.

1.4 What is the public's role?

Minnesota needs your help to make informed decisions.

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

1.5 What is an Environmental Assessment?

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

This Environmental Assessment (EA) contains an overview of affected resources and discusses potential human and environmental impacts and mitigation measures. Energy Environmental Review and Analysis staff within the Commerce Department (Commerce) prepare 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.

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

[5] Xcel Energy, Application for a Site Permit for the Sherco Solar 3.Project, August 8, 2023, eDocket ID: 20238-198095-01, 20238-198095-02, 20238-198095-03, 20238-198095-04, 20238-198095-06

[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.

If you would like more information or if you have questions, please contact Commerce staff: Suzanne Steinhauer (suzanne.steinhauer@state.mn.us),(651) 539-1843 or the Commission Staff: Jacques Harvieux (jacques.harvieux@state.mn.us) (651) 201-2233.

Information about the project, including the site permit application, notices, and public comments, can be found on eDockets: https://www.edockets.state.mn.us/EFiling/search.jsp by searching "23" for year and "217". Information is also available on Commerce's webpage for the project: https://apps.commerce.state.mn.us/web/project/15104.

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* in Minnesota statute, which is any electric power generating equipment designed for or capable of operation at a capacity of 50 MW or more.

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

1.8 What are the potential impacts of the project?

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

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

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

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

1.8.1 Human Settlement

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

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

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

Land Use and Zoning: The impact intensity level is anticipated to be moderate. Land use impacts are anticipated to be long-term and localized. The proposed solar facility is generally consistent with local land use ordinances and the Sherburne County's Comprehensive Plan. 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. The impact intensity level during construction will range from negligible to significant depending on the activity. Potential impacts are anticipated to be intermittent and short-term. These localized impacts may affect nearby residences and might exceed state noise standards. Impacts are unavoidable but can be minimized. Operational impacts are anticipated to be negligible.

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

Tourism and Recreation: The impact intensity level to tourism and recreation resources is anticipated to be minimal. Most impacts will be short-term and related to construction. Impacts to a snowmobile trail can be mitigated.

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

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

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

1.8.2 Human Health and Safety

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

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

Public Safety and Emergency Services: Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Public risks involve electrocution. Electrocution risks could also result from unauthorized entry into the fenced area of the solar facility. Potential impacts are anticipated to be minimal. Impacts would be short- and long-term and can be minimized.

1.8.3 Land-based Economies

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

Agriculture: Potential impacts to agricultural producers are anticipated to be minimal—lost farming revenues will be offset by easement agreements. A negligible loss of farmland in Sherburne 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.

1.8.4 Archeological and Historic Resources

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

1.8.5 Natural Resources

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

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

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

Soils: Impacts to soils will occur during construction and decommissioning of the project. The impact intensity level is expected to be minimal 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 native perennial vegetation for the life of the project, soil health is likely to improve.

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

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

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

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 C**.

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 health and safety factor includes an EMF element.

Factor M (unavoidable impacts) and **Factor N** (irreversible and irretrievable resource commitments) are discussed in Section 0 and Section 4.9, respectively, of this EA.. **Factor G** (application of design options) and **Factor L** (costs dependent on design) do not apply as the design of the proposed project is the only design under consideration.

Other factors are ranked as follows:

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

Table 1 Application of Siting Factors- Solar Facility

Factor A: Human Settlement		
Element	**Construction**	**Operation**
Aesthetics	○	○
Displacement	●	●
Cultural Values	○	○
Electric Interference	●	●
Floodplains	●	●
Land Use and Zoning	●	●
Noise	⊘	●
Property Values*	○	●

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

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	●	●
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 already many smaller solar facilities in the project area as well as Sherco Solar 1 and 2 projects that are under construction (Figure 8), the project will not be an entirely new type of feature on the landscape. For those with high viewer sensitivity, for example, neighboring landowners, visual impacts are anticipated to be moderate to significant, while for those that travel through the project area, visual impacts are likely to be minimal, although noticeable.

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

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 C: LAND-BASED ECONOMICS

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

FACTOR E: NATURAL RESOURCES

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

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

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 summarizing the public hearing and any comments received.

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 decision in mid- 2024.

2 Proposed Project

Xcel Energy proposes to construct an up to 250 MW solar facility in the city of Clear Lake and Clear Lake Township in Sherburne County, Minnesota. The developed portion of the Project will occupy approximately 1,303 acres of the 1,780 acres under lease. The project would interconnect to the electrical grid at the Sherco Solar West Block Collector Substation via below-ground 34.5 kilovolts (kV) electric collection lines. This chapter describes the project and how it would be constructed, operated, and decommissioned.

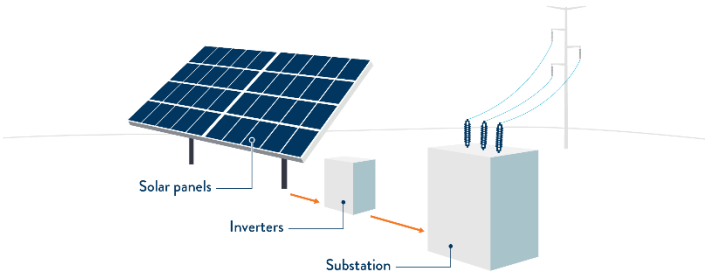
2.1 Solar Facility

2.1.1 How do solar facilities generate electricity?

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

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

Figure 2. Solar Facility Schematic



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

2.1.2 Where is the Project located?

The Project is located in Clear Lake Township and the City of Clear Lake in Sherburne County, Minnesota (Figure 1).

As shown in Figure 1, the solar facility is comprised of nine units that are generally located south and east of the city of Clear Lake. Most of the Project is located within Clear Lake Township, although a small portion of Units 1 and 2 are located within the city. Units 1 – 8 are between US Highway 10 and the Mississippi River, while Unit 9 is located north of US Highway 10. Table 2 summarizes the project location. The solar facility would be located on approximately 1,303 acres within a leased area of approximately 1,680 acres. The site is primarily (93 percent) used as cultivated farmland. The collection corridors would be located on approximately 100 acres where Xcel Energy has, or is seeking, voluntary easements from landowners.

Xcel Energy selected the site based on transmission and interconnection availability and landowner interest. Xcel Energy indicates that it has entered into lease agreements necessary to construct and operate the solar facility and that it has obtained easements for all Collection Corridors except for Collection Corridor U09/U09 Alt. [9] Xcel Energy indicates that it continues to seek a voluntary easement for a Collection Corridor to Unit 9, but if it is unable to secure voluntary agreements with landowners prior to construction, it may seek to secure and pay the affected landowner under eminent domain proceedings.[10]

Table 2. Solar Facility Project Location

Solar Facility					
Lease Area	Township/City Name	Township	Range	Section(s)	Acres
Unit 1	Clear Lake Township, City of Clear Lake	34N	30W 29W	13, 24 18, 19	785.1
Unit 2	Clear Lake Township, City of Clear Lake	34N	29W	18	123.6
Unit 3	Clear Lake Township	34N	30W	23	58.1
Unit 4	Clear Lake Township	34N	30W	24	51.6
Unit 5	Clear Lake Township	34N	30W	24, 25	112.9
Unit 6	Clear Lake Township	34N	30W	24	52.5
Unit 7	Clear Lake Township	34N	30W	24	80.7
Unit 8	Clear Lake Township	34N	29W	17	89.2
Unit 9	Clear Lake Township	34N	29W	15, 16	326.0
Solar Facility Subtotal					**1,680.0**
Collection Corridors					
Corridor	Township/City Name	Township	Range	Section(s)	Acres
Corridor U02	Clear Lake Township, City of Clear Lake	34N	29W	18	0.4
Corridor U09[1]	Clear Lake Township	34N	29W	15	0.0
Corridor U09 Alt	Clear Lake Township	34N	29W	15, 16	5.2
Corridor Easement U04	Clear Lake Township	34N	30W	24	0.8
Corridor Homerun	Clear Lake Township	34N	29W	15, 19-22, 27, 28	82.6
Corridor ROW U02	Clear Lake Township, City of Clear Lake	34N	29W	17, 18	9.9
Corridor ROW U04	Clear Lake Township	34N	30W	24	1.0
Collection Corridor Subtotal					100.0
Total Land Control Area					**1,780**

1 The site layout includes two Collection Corridor options from Unit 9: Collection Corridors U09 and U09 Alt. Collection Corridor U09 Alt was used to present a more conservative acreage for the Project size and impacts. Collection Corridor U09 (2.0 acres) is not included in the corridor subtotal.
Note: addends may not sum due to rounding.

[9] SPA, p.14
[10] Xcel Energy, Comment, December 21, 2023, eDocket no. 202312-201477-01

2.1.3 How is the solar facility designed?

The Project will consist of PV panels, trackers, inverters, transformers, access roads, security fencing, above-ground and below-ground electric collection and communication lines, up to eight weather stations. The solar facility consists of bi-facial PV solar panels mounted on a single-access linear axis tracking system, inverters, transformers access roads, security fencing, above-ground and below-ground electrical collection and communication lines, up to 8 weather stations, an underground collector system connecting the generating facility to the Sherco Solar West Substation. The Project will not have its own dedicated operations and maintenance facility. Operations and maintenance personnel will be based out of the Sherco Generating Plant, located southeast of the site in Becker, Minnesota.[11]

2.1.3.1 SOLAR ARRAYS

Xcel Energy anticipates using bifacial solar panels with dimensions of approximately four to 6.5 feet long by two to 3.5 feet and a thickness of one to two inches The bifacial panels use a transparent backside that allows the panels to absorb solar energy from both sides of the panel, allowing for increased production when compared to traditional monofacial panels. The solar panels and tracking system will be installed on metal foundations that are driven directly into the ground (Figure 3). The arrays are arranged in rows oriented north and south. Small motors rotate the panels to follow the sun throughout the day, tilting east in the morning, paralleling the ground at zero degrees mid-day, and tilting west in the afternoon. This tracking of the sun maximizes the project's electrical production. When tilted to their highest position (early and late in the day), the top edge of the solar panels will be no more than 20 feet above the ground. [12]

Xcel Energy will rely on up to eight weather stations.to verify the solar facility is performing as expected and to provide an accurate prediction of the facility output. These weather stations, up to 20 feet in height, would be located throughout the fenced area of the facility.[13]

[11] US EIA, *Electric Power Monthly*, Table 6.07b, Capacity Factor for Utility Scale Generators Primarily Using Non-Fossil Fuels, https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_6_07_b)
[12] SPA, pp. 19 – 21, Figure 2.2.3
[13] SPA, p. 25.

Figure 3. Typical Solar Array

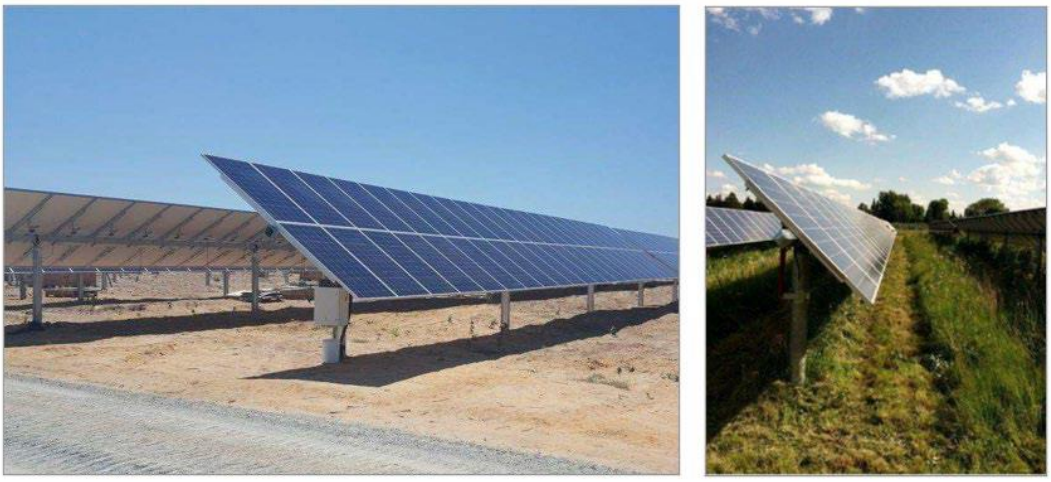
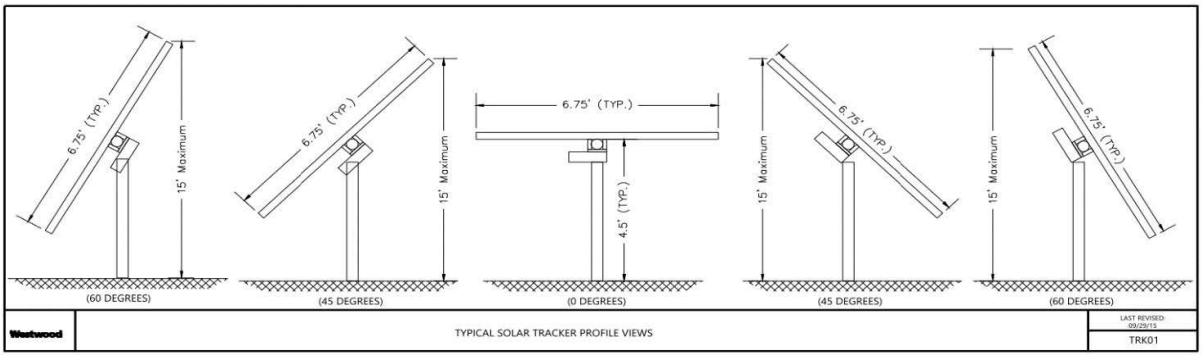


Figure 4. Typical Solar Tracking Profile



2.1.3.2 Electrical Collection System

The direct current (DC) electrical energy generated by the solar panels (about 1,500 volts DC) will be delivered to approximately 70 inverters. The inverters convert the electricity to about 630 volts (depending upon inverter specifications) alternating current (AC) and then the transformer will step up the power to 34.5 kV for transmission through an underground collector system to the Sherco Solar West Substation. Depending upon final project design the total length of the undergroudn collection corridors is anticipated to be approximately 8 – 8.5 miles. Power inverters, will be placed on inverter "skids," concrete pads approximately 10 feet wide by 25 feet long, for a total height of approximately 12 feet above grade.[14] From a distance, inverters skids will look like one-half of a semi-

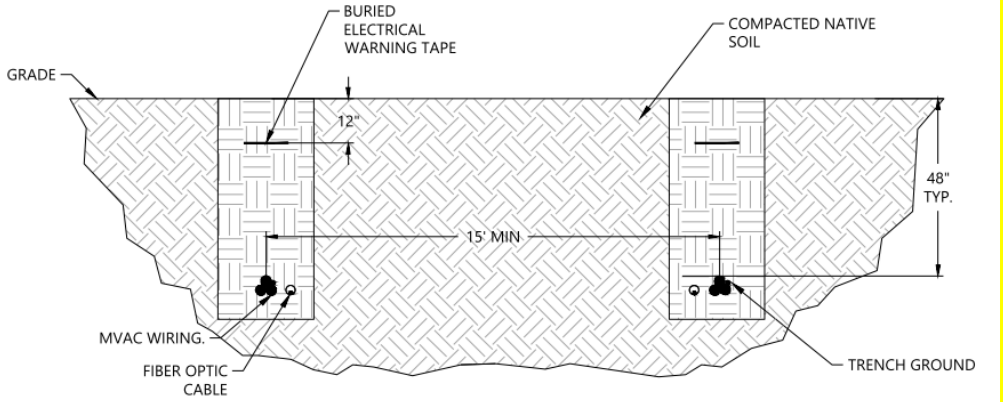
Figure 5. Inverter

[14] SPA, p. 23

trailer box (Figure 5). The skids will be placed on concrete slab or pier foundations. The final number of inverters will depend on the inverters selected for the project as well as the final solar panel configuration.

Electrical energy (34.5 kV AC) will be transmitted from inverter skids to the Sherco Solar West Substation through underground cables (Figure 6). Cabling will be trenched or plowed into place to a dept of at least four feet, deeper if necessary to avoid other utilities or infrastructure.[15]

Figure 6: Underground Cabling



FENCING

All solar arrays will be fenced for security. Fencing will be secured to posts that will be directly embedded in the soil or set in concrete foundations as required for structural integrity. AT the time of application, Xcel Energy anticipated that the security fencing would use agricultural wire fencing with a height of approximately eight feet. Xcel Energy will install security lighting and cameras at gates.[16]

The solar facility will be accessed through locked gates at 18 locations:[17]

- Unit 1 will have five total access points; three access points off 80th Avenue Southeast and two access points off 70th Avenue Southeast.
- Unit 2 has one access point off 80th Avenue Southeast (CR 58).
- Unit 3 will have two access points off the unnamed dirt access road on the east side of the unit.
- Unit 4 will have two access points; one off CR 8 and one off an unnamed dirt road on the west side of the unit.

[15] SPA, pp. 22-23
[16] SPA, pp. 24-25
[17] SPA, pp. 24 and 66

- Unit 5 will have three total access points; one off CR 8, one on the southern fence line of the northern portion of the array connecting via a short road to a gate on the northern fence line of the southern portion of the array.
- Unit 6 will have one access point off CR 8.
- Unit 7 will have one access point off 70th Avenue SE.
- Unit 8 will have one access point off 90th Avenue SE.
- Unit 9 will have two total access points, one access point off 100th Avenue SE and one access point off 87th Street SE.

ACCESS ROADS

Although the total length of access roads will depend upon final site design, the preliminary layout anticipates approximately 19.4 miles of internal graveled access roads. These roads will be used for operations and maintenance activities. Roads will be approximately 16 feet wide along straight portions and up to up to 45 feet at curves and intersections.[18]

2.1.4 How would the solar facility be constructed?

Xcel Energy anticipates that construction of the solar facility will begin in mid-2024 with an in-service date of December 31, 2025. This section summarizes construction activities. Unless otherwise noted, this summary has been adapted from Section 2.2. and Appendix F, the *Agricultural Impact Mitigation Plan* (AIMP) of the site permit application.

Xcel Energy anticipates that construction will begin in mid-2024 to meet an in-service date of December 31, 2025. The actual construction schedule is dependent upon permitting, final design, delivery of equipment, and workforce availability.

Work force mobilization and initial site preparation will begin after all necessary permits and approvals have been received. Initial site preparation includes vegetation removal, grading, tree removal, site access improvements, and preparation of a staging and laydown areas and job site trailers. Xcel Energy anticipates a laydown are of approximately nine acres. The applicant anticipates grading in only select areas to provide a level workspace and maintain soil stability in areas with a slope of greater than dive percent to accommodate the panels, inverters, access roads.

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

The applicant estimates that for several weeks – during delivery of the trackers and solar panels – there will be between 30 and 40 semi-truck deliveries daily. Traffic will decrease once these components are delivered. Traffic volume during construction will predominantly come from worker travel to the construction site. Xcel Energy estimates daily construction traffic of about 275 to 350 light duty trucks and cars during the 18 months of construction.[19]

[18] SPA, p. 24
[19] SPA, p.67

The applicant estimates that the project will create approximately 490 temporary construction jobs, averaging approximately 300 jobs over the construction timeframe, and 12 full-time jobs to operate and maintain the Project.[20]

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

Access Roads

Construction of permanent site entrances, access roads and turnouts will start with the stripping and segregating of topsoil materials from the proposed roads. Topsoil removed from permanent access roads will be stockpiled in suitable locations on-site to facilitate final reclamation during decommissioning After the topsoil has been segregated, the contractor will compact the subgrade materials along the access roads (typically 16 feet wide) to the specified compaction requirements specified in the civil and geotechnical engineer plans. Depending on the soil type and location, a geo fabric may be spread on the compacted area. A layer of 4 to 12 inches of gravel will be applied level with the existing grade to facilitate drainage and minimize ponding. The gravel will then be compacted. Following compaction of the access roads, the Contractor will shape drainage ditches as specified in the grading plan.

Solar Arrays

Solar arrays will be constructed in blocks, and multiple blocks will be constructed simultaneously. The tracking system and solar panels will be mounted on steel posts. In areas helical screw or auger-type foundation posts may be required to ensure stability. Pier depth will depend on final geotechnical analysis and design. The tracking system and supports for the solar panels (racking) will be bolted to the posts. Solar panels, including electrical connections, grounding, and cable management systems, will be installed by crews using hand tools.

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 from 630 volts to 34.5 kV at the adjacent electric transformer. Premanufactured inverter skids (each containing and inverter, transformer, and SCACA equipment) will be installed on concrete or pier foundations. Topsoil at inverter locations will be scraped and stockpiled for later use in site restoration. Concrete foundations may be poured on-site or pre-cast and then assembled. A flatbed trailer truck will deliver the premanufactured skids to each foundation where the skids will be set in place using a hydraulic crane. The preliminary design anticipates

Electrical Collector System

Xcel Energy anticipates using both underground and above-ground 34.5 kV DC collector cables within the arrays, although depending upon final design. The electrical collection system will be installed below-ground Cable for the AC electrical collection system will be placed at least four feet

[20] SPA, pp. 53, 34

underground. A trench will be excavated for the cabling in accordance with the agricultural impact mitigation plan (AIMP); topsoil and subsoil will be segregated and stockpiled. Once cabling is installed in the trench, the trench will be backfilled with subsoil followed by topsoil. At some locations the underground collectors will be installed with horizontal directional drilling under roadways.

Stormwater Drainage

At the time of the application, the preliminary design did not include any stormwater drainage basins, and Xcel Energy indicated that the highly drained soils at the site would make drainage basins unnecessary. Xcel Energy indicates that it may include permanent and temporary stormwater basins as part of its stormwater treatment system. If stormwater ponds are included in the design of the Project, contractors would remove topsoil to be temporarily stored at a suitable location. Subsoil would be excavated in accordance with design depths and slopes to accommodate inlets and outlets. Excavated subsoil would be distributed throughout the site as fill material in areas where grading is required. Topsoil would be replaced, and the basis will be seeded with a seed mixture that is tolerant of wet conditions.

Fencing

Xcel Energy will install permanent security fencing around the developed area of each unit. Preliminary design anticipates approximately 17.5 miles of fencing in total.[21] Xcel Energy anticipated using agricultural woven wire fencing with a height of approximately eight feet from the ground. Fence posts will be directly embedded or set in concrete foundations at corner and gate posts and in some locations as necessary. Gates will be installed at each entrance. Xcel Energy will install security cameras at locations along the fence lines and downlit security lighting at entrances.

Restoration

After construction, the developed area will be graded to natural contours (as possible) and soils will be de-compacted. Disturbed areas will be reseeded with native seed mixes in accordance with the project's vegetation management plan (VMP) and stormwater pollution prevention plan (SWPPP). Erosion control measures will be used until seeded vegetation has established – e.g., silt fences, mulch, sediment control logs. Additionally, a cover crop will be planted to prevent erosion during the time it takes for native seeds / vegetation to establish.

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

[21] SPA, Appendix H, Decommissioning Plan

2.1.5 How would the solar facility be operated and maintained?

Xcel Energy estimates the service life of the project to be 35 years.[22] Following restoration and construction closeout, control of the solar facility will transfer from the construction team to the operations staff. Up to 12 full time maintenance staff will perform regularly scheduled inspections of electrical equipment, maintain or repair equipment as needed, maintain vegetation at the site, and remove snow as needed (Table 3). The applicant indicates that maintenance of the project will include inspection of electrical equipment, vegetation management, and snow removal (as needed). The electrical performance of the project will be monitored in real-time by a supervisory control and data acquisition (SCADA) system. The SCADA system allows for early notification of abnormal operations, which facilitates prompt maintenance and repair. Xcel Energy may use its own employees or contract with an experienced provider for O&M services. [23]

Table 3. Operations and Maintenance Tasks and Frequency

Facility	Task	Preliminary Frequency
PV Field	PV panels visual check	Once Yearly
	Wirings and junction boxes visual check	Once Yearly
	PV strings measurement of the insulation	Once Yearly
	PV strings and string boxes faults	Once Yearly
	PV panels washing	No regular washing planned (only as site-specific conditions warrant)
	Vegetation mowing (if necessary)	Up to three times a year depending on site conditions
Electric Boards	Case visual check	Once Yearly
	Fuses check	Once Yearly
	Surge arresters check	Once Yearly
	Torque check	Once Yearly
	DC voltage and current check	Once Yearly
	Grounding check	Once Yearly
Inverter	Case visual inspection	Once Yearly
	Air intake and filters inspections	Once Yearly
	Conversion stop for lack of voltage	Once yearly
	AC voltage and current check	Once yearly
	Conversion efficiency inspection	Once yearly
	Datalogger memory download	Once yearly
	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

[22] SPA, p. 9
[23] SPA, pp 34 – 36

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

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

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

If the project is not repowered, Xcel Energy will decommission the project and remove the project facilities. Decommissioning would include removal of the solar arrays (panels, racking, and steel posts), inverters, fencing, access roads, and lighting, Above-ground electrical and communications cabling would be removed; below-ground cabling would be removed to a depth of four feet. If the project is decommissioned, Xcel Energy assumes the site will return to agricultural use. To this end, best management practices will be used during decommissioning to minimize soil erosion and maintain natural hydrology. Areas of compacted soils will be de-compacted to support agricultural use. Decommissioning and site restoration is estimated to take approximately one year.

Xcel Energy states it will be responsible for all decommissioning costs. Like other regulated utilities in Minnesota and elsewhere, Xcel Energy anticipates the total estimated cost to decommission the Project is approximately $20,192,400 ($64,101 per MW). Estimated salvage/scrap value is approximately $34,013,600, for a net decommissioning costs of approximately $13,821,200 in surplus, or $43,876 in surplus per MW.

Xcel Energy uses a net salvage methodology, where net estimated decommissioning costs (anticipated cost of removing an asset at the end of its useful life less the anticipated salvage value,), are included in the depreciation expense for each facility. The depreciated plant balance is included in the utility's rate base. Funds collected for removal and restoration are included in the depreciation reserve for the facility. Utilities are required to periodically update these costs and the Commission must approve the net salvage rates used for the Project.

2.2 Project Costs

Xcel Energy estimates the total cost to construct the project to be approximately $434 million (Table 4). Actual costs will depend on final material and labor costs.

Table 4. Estimated Project Costs[24]

Project Component	Estimated Cost (millions)
Engineering, procurement, and construction contractor	$386,291,000
Development expense*	$20,485,000
Interconnection (preliminary)	N/A
Financing (Allowance for funds used during construction)	$27,073,000
Total Project Cost	$433,849,000

2.3 Project Schedule

Xcel Energy anticipates the project will begin commercial operation by the end of 2025. Table 5 shows Xcel Energy's estimated development and construction milestones.

Table 5. Anticipated Project Schedule[25]

Activity	Anticipated Timeframe
Land Acquisition	Complete for Solar Facility, in process for collection corridor
Commission Site Permit	Q2/Q3 2024
Downstream Permits	Q3/Q4, 2024
Construction	Q3 2024
Testing and Commissioning	Q3/Q4 2025
Commercial Operation Date	Q4 2025

[24] **Appendix D,** response to Question 3
[25] Adapted from SPA, Appendix B,

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3 Regulatory Framework

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

3.1 What Commission approvals are required?

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

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

3.2 What is environmental review?

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

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

Minnesota law provides the Commission with two processes to review site permit applications. The alternative process, which applies to solar generating facilities, such as the project, requires an EA instead of an environmental impact statement and a public hearing instead of the more formal contested-case hearing.[26,]

3.3 What permitting steps have occurred to date?

The Commission accepted the site permit application as complete on October 10, 2023. Public information and scoping meetings were held in Clear Lake, Minnesota on November 7, 2023, and online on November 8, 2023.

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

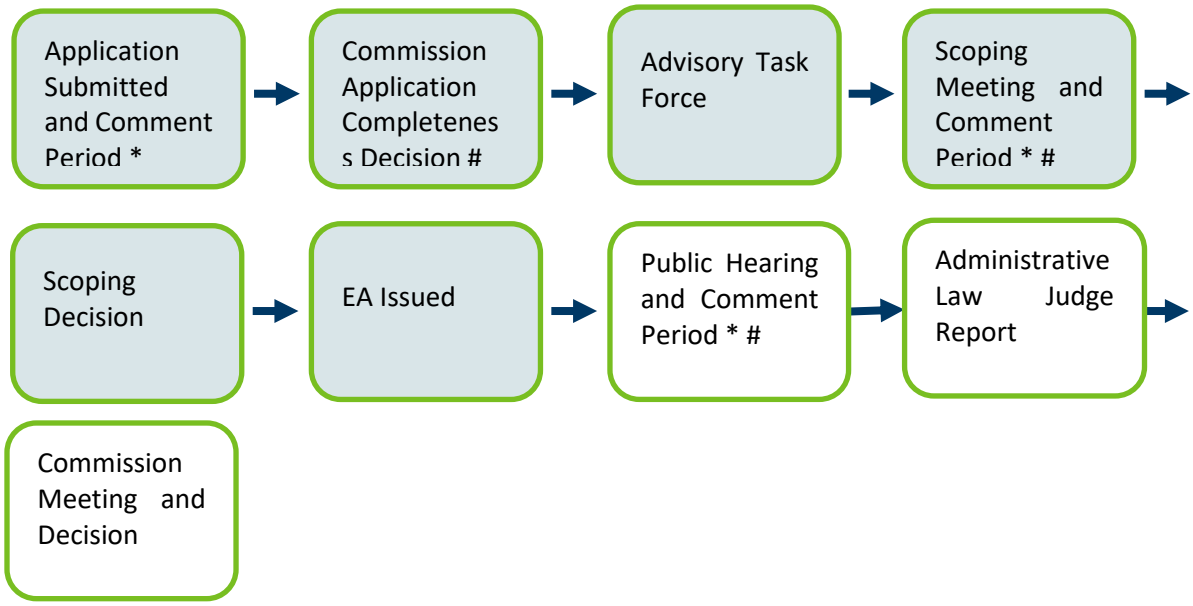
Application Filing and Acceptance

Xcel Energy provided the required written notice of its intent to file a site permit under the alternative process on June 16, 20213.[27]

Xcel Energy filed an application for a site permit on August 8, 2023.[28] The Commission accepted the application as substantially complete in its order dated October 10, 2023.[29] The order also referred the matter to the Office of Administrative Hearings for appointment of an administrative law judge (ALJ) to conduct a public hearing for the project. Commission staff provided a *Sample Site Permit for a Solar Energy Generating System* on November 27, 2023.[30]

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

Figure 7. Simplified Process Summary[31]



[27] Xcel Energy, Notification of Application for a Site Permit Under the Alternative Permitting Process for the Proposed up to 250 MW Sherco Solar 3 Project in Sherburne County, Minnesota., June 16, 2023, eDocket ID: 20236-196620-01 .

[28] Xcel Energy, *Application for a Site Permit for the Sherco Solar 3.Project*, August 8, 2023, eDocket ID: 20238-198095-01, 20238-198095-02, 20238-198095-03, 20238-198095-04, 20238-198095-06, ..

[29] Commission, *Order*, October 23, 2023, eDocket ID: 202310-199802-01

[30] Commission Staff, Sample Solar Site Permit, November 27, 2023, eDockets No. 202311-200753-01

[31] Read from left to right; shaded steps are complete; "*" means public comment opportunity and "#" means public meeting opportunity.)

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 comments have been compiled and are available to review or download.

Scoping includes a public meeting and comment period that provide opportunities for interested persons to help develop the scope (or contents) of the EA.[32] 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.

On October 20, 2023, the Commission and Commerce issued a joint *Notice of Public Information and Environmental Assessment Scoping Meeting* and associated public comment period.[33] The notice was sent to those individuals on the project contact list and to potentially affected landowner and was also available on Commerce's webpage for the Project.

Commission and Commerce staff held public information and scoping meetings in Clear Lake, Minnesota on November 7, 2023, and an online meeting on November 8, 2023. The comment period closed on November 22, 2023. Approximately 80 people attended the Clear Lake meeting and approximately 27 attendees provided public comments. There were no public comments at the online meeting.[34] Written comments were received from 20 members of the public.[35]

In addition to expressions of opposition to and support for the project, public comments addressed a number of potential impacts and concerns related to the project including: wildlife impacts; use of productive agricultural land for solar generation, aesthetic impacts; impacts to cemeteries, particularly St. Marcus Cemetery which borders the project; impacts to property values; glare and reflection of radiant heat from PV panels; impacts on farming including potential soil warming in fields near the project; easement acquisition; health effects from electromagnetic fields (EMF);

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

[33] Commission and Commerce *Notice of Public Information and Environmental Review Scoping Meeting*, October 20, 2023, eDocket ID: 202310-199763-01

[34] Oral Comments, Public Scoping and Information Meetings, Clear Lake, Minnesota, November 7, 2023 and virtual meeting, November 8, 2023, eDocket ID: 202311-200731-09. Note – several of the speakers in the meeting transcript did not identify themselves for the record, so a total count of speakers is approximate.

[35] Barry and Brenda Schuldt Comment, eDocket ID: 202312-201154-01; David McDonald Comment, eDocket ID: 202312-201056-01; Erin Geiger Comment, eDocket ID: 202311-200856-01; Tracy Sodon Comment, eDocket ID: 202311-200809-01 ; Mary Simpler Comments, eDocket ID: 202311-200730-01, 202311-200730-02; 202311-200730-03; Ron and Debbie Schabel Comments, eDocket ID: 202311-200730-04;Thomas Hentges Comment, eDocket ID: 202311-200730-05; Bret Collier Comment, eDocket ID: 202311-200730-06; Carl and Paula Erdman Comment, eDocket ID: 202311-200730-07; Bonne Kaiawe Comment, eDocket ID: 202311-200730-08 ; Josh Ramsey Comment, eDocket ID: 202311-200730-10; Jared and Nicole Matson Comment, eDocket ID: 202311-200731-01; Katie Brenny, eDocket ID: 202311-200731-02; Kim and Steve Butkowski Comment, eDocket ID: 202311-200731-03; Jeff Edling Comment, eDocket ID: 202311-200731-04; Joseph Backowski Comments, eDocket ID: 202311-200731-05, 202311-200731-06; Paul and Kathy Gray Comment, eDocket ID: 202311-200731-07; Reed Hentges Comment, eDocket ID: 202311-200731-08; Bridget Huber Comment, eDocket ID: 20242-203070-01; Cassie Kozak Comment, eDocket ID: 20242-203070-02

decommissioning; concern with potential hazardous materials in PV panels; upstream impacts from mining of materials used in PV panels; potential wetland and surface water contamination from stormwater runoff; concerns with potential for groundwater contamination from broken PV panels; impacts on the PV panels from severe weather and who bears the cost of panel replacement; limitations on future expansion of the city of Clear Lake; the level of subsidies for solar development; and the wisdom of replacing coal with solar.

The Minnesota Department of Transportation (MnDOT) provided comments on the collection line crossings of US Highway 10 and the need for ongoing coordination with MnDOT regarding accommodation of the proposed collector lines and future construction activities for both MnDOT and the applicant.[36]

The Minnesota Department of Natural Resources (DNR) provided comments on the proposed fencing, the presence of hydric soils within the site, lighting impacts, dust control, and potential impacts to sensitive species (Blanding's turtles, loggerhead shrikes, and bats) and wildlife generally. The DNR recommended mitigation measures including timing of construction activities and tree removal, the use of wildlife-friendly erosion control, avoidance of dust control methods containing chlorides, potential survey requirements, and use of downlit lighting that minimizes blue hues, backlight, and glare.[37]

Xcel Energy filed comments on December 21, 2023.[38] Xcel Energy responded to public comments expressing concern with the project's proximity to the St. Marcus Cemetery and easements for the collector lines, and DNR comments on the security fence, hydric soils, protected species mitigations, facility lighting, and dust control.

SCOPING DECISION

The scoping decision identifies the issues studied in this EA.

After considering public comments and recommendations by staff, the assistant commissioner of Commerce issued a scoping decision on January 24, 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.[39] Table 6 lists potential downstream permits that might be required, several of which are discussed below.

[36] MnDOT Comment, November 22, 2022, eDocket ID: 202311-200722-01
[37] DNR, Comment November 21, 2023, eDocket ID: 202311-200627-01
[38] Xcel Energy, Comments, December 21, 2023, eDockets: 202312-201477-01
[39] DSP (Appendix C), Section 4.5.2 (stating the permittee "shall obtain all required permits for the project and comply with the conditions of those permits").

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".[40] 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.

A permit is required from the U.S. Fish and Wildlife Service (USFWS) for the incidental taking[41] of any threatened or endangered species. As a result, USFWS encourages project proposers to consult with the agency to determine if a project has the potential to impact federally listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Table 6. Potential Downstream Permits

Unit of Government	Type of Application	Purpose	Anticipated for Project
Federal			
U.S. Army Corps of Engineers	Section 404 Clean Water Act – Dredge and Fill	Protects water quality by controlling discharges of dredged and fill material.	No
U.S. Environmental Protection Agency	Spill Prevention, Control and Countermeasures Plan		No
U.S. Fish and Wildlife Service	Threatened and Endangered Species Consultation	Consultation to mitigate impacts to federally listed species	No
	Nest Removal Permit under Bald and Golden Eagle Protection Act	Required in the event of removal of a bald eagle nest	Possible
State			
Department of Natural Resources	License to Cross Public Lands and Waters	Prevent impacts associated with crossing public lands and waters	No
	State Threatened and Endangered Species Consultation	Consultation to mitigate impacts to state-listed species	Yes
	Water Appropriation Permit	Balances competing management objectives; may be required for construction dewatering	Possible
Minnesota Pollution Control Agency	Construction Stormwater Permit	Minimizes temporary and permanent impacts from stormwater	Yes

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

[41] 16 U.S. § 1532(19) (defining "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct).

Unit of Government	Type of Application	Purpose	Anticipated for Project
	Section 401 Clean Water Act – Water Quality Certification	Ensures project will comply with state water quality standards	No
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	No
Board of Water and Soil Resources	Wetland Conservation Act	Ensures conservation of wetlands	No
Local			
Sherburne County	Right-of-Way/Utility Permit	Needed to construct or maintain electrical lines along or across county highway ROW	Possible
	Application for driveway/entrance	Needed to move, widen, or create a new driveway access to county roads	Yes
	Wetland Conservation Act Permit	Ensures conservation of wetlands	No
	Moving Permit/ Oversize/Overweight Vehicle Permit	Needed to transport oversized and overweight loads on county roads	Yes
Other			
Burlington Northern and Santa Fe Railroad	Utility Agreement License	Required to bore collection lines beneath railroad property	Yes

3.4.2 State

Potential impacts to state lands and waters, as well as fish and wildlife resources, are regulated by the DNR. Licenses are required to cross state lands or waters.[42] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a *Public Waters Work Permit*.[43] 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.

[42] Minnesota Statutes 84.415.

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

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."[44] The CSW Permit requires use of best management practices; development of a Stormwater Pollution Prevention Plan; and adequate stormwater treatment capacity once the project is complete. Projects must be designed so that stormwater discharged after construction does not violate state water quality standards. Specifically, projects with net increases of one acre or more to impervious surface must be designed to treat water volumes of one-inch times the net increase in impervious surface. PV panels are impervious, and are counted towards total impervious surface along with access roads, buildings, etc. The area beneath the panel, however, is pervious if properly vegetated. To account for this, MPCA developed a solar panel calculator that estimates the amount of stormwater retained by PV solar facilities. This amount can be applied as a credit towards the total amount of stormwater treatment needed for a project.[45]

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."[46] The certification becomes a condition of the federal permit.

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

A permit from MnDOT is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way.[47] Coordination would be required to construct access roads or driveways from trunk highways.[48] These permits are required to ensure that use of the right-of-way does not interfere with free and safe flow of traffic, among other reasons.[49]

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

The Minnesota Department of Agriculture (MDA) ensures the integrity of Minnesota's food supply while protecting the health of its environment and the resources required for food production. MDA

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[44] MPCA. *Construction Stormwater*. (2022). https://www.pca.state.mn.us/business-with-us/construction-stormwater

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

[46] 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.

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

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

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

assists in the development of agricultural impact mitigation plans that outline necessary steps to avoid and mitigate impacts to agricultural lands.

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

3.4.3 Local

Sherburne 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."[50]

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

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

3.5 Do electrical codes apply?

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

The project must meet requirements of the National Electrical Safety Code.[51] These standards are designed to safeguard human health "from hazards arising from the installation, operation, or maintenance of conductors and equipment in electric supply stations and overhead and underground electric supply lines".[52] 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.

3.6 Are any issues outside the scope of this EA?

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

This EA does not address the following:

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[50] Minnesota. Rule. 8420.0100, subp. 2.

[51] *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)

[52] 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.

- The need for the project, including questions of size, type, timing, and alternative system configurations.
- Any impacts related to the manufacture of the elements of the project including PV panels, posts, concrete, fuel used for construction vehicles, etc.
- The manner in which landowners are compensated for the project.

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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 (Sherburne County)

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

Table 7. Regions of Influence for Human and Environmental Resources

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

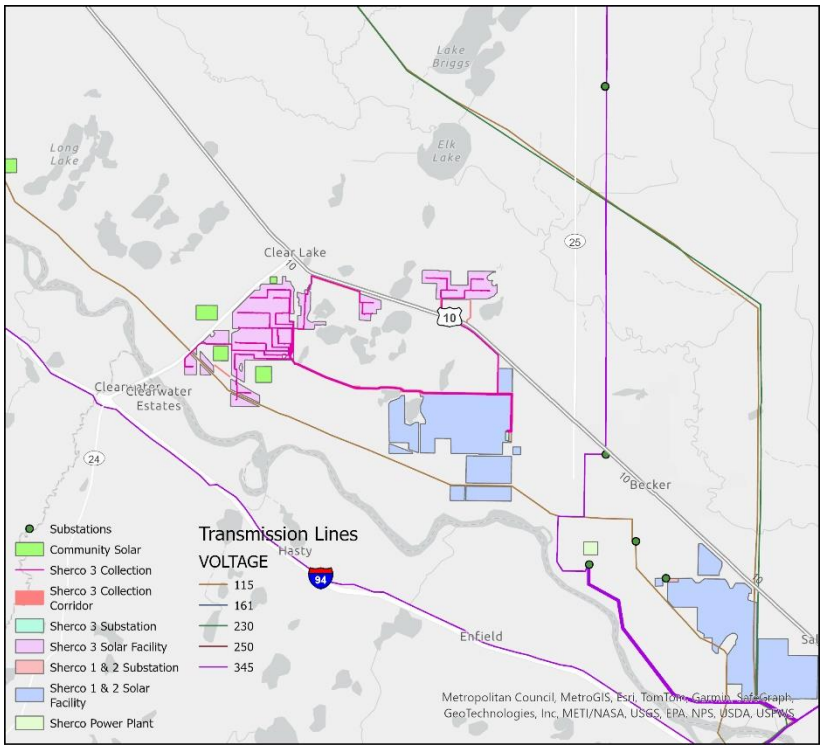
4.2 Project Setting

The project is in a rural area, generally between the Mississippi River and US Highway 10 in south and east of Clear Lake in Sherburne County. Sherburne County is a rapidly growing area of Minnesota. The project area is dominated by agricultural land uses and scattered farmsteads, with developed areas in Clear Lake. There are also several existing community-scale and utility-scale solar generating facilities and transmission infrastructure in the project area

The proposed solar facility is located in Clear Lake township and the city of Clear Lake in Sherburne County, Minnesota. Units 1 – 8 are south of US Highway 10, and Unit 9 is north of US Highway 10, (Figure 1). The topography of the land control area is generally flat, with a range in surface elevation from approximately 960 to 995 feet. There are several lakes in the project area, and the site is approximately one-half mile north of the Mississippi River at its closest point.

The project is in the Anoka Sandplain (222 Mc) subsection of the Eastern Broadleaf Forest Province.[53] Prior to European settlement vegetation in the project area was primarily oak barrens and openings, with characteristic trees being bur oak and northern pin oak. Species associated with oak openings and barrens are still present, however large areas of these species are uncommon. The current land-use in the project area is predominately agricultural.

Figure 8. Area Energy Infrastructure



Land use in the project area is predominantly agricultural, but includes developed areas in the city of Clear Lake and other residential areas, transportation corridors, and commercial and industrial uses, including other solar energy facilities. Land use within the area of land control is dominated by agricultural; approximately 93 percent of the 1,780 acre land control area is currently used for cultivated agriculture (primarily corn, soybeans, and potatoes). Built features common to the area include residences and buildings, paved and gravel roads, both community-scale and utility-scale solar facilities, and transmission lines. There are also several energy infrastructure projects in the region including community-scale and utility-scale solar facilities, transmission lines, and the existing Sherco Generating Plant (Figure 8).

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

4.3 Human Settlement

Large energy projects can impact human settlement. 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, US Highway 10, and nearby residences. For most people who pass through the project area on US Highway 10 or local roads the impact intensity level is expected to be minimal. For individuals with greater viewer sensitivity, such as people who live in the project area, the impact intensity level is anticipated to be moderate to significant. Impacts will be short- and long-term, and localized. Potential impacts are unavoidable but can be mitigated in part.

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

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

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

The existing landscape in the project is area is rural and agricultural consisting of generally flat terrain, dominated by row crop fields of corn, soybeans, and potatoes. The built environment in the project area includes the city of Clear Lake, roads, an airport, a railroad, transmission and distribution lines, existing community solar facilities, and new utility-scale solar facilities that were under construction at the tie this report was prepared. Residences and farmstead are scattered throughout the project area. There are no residences or businesses within the area of site control; however, there are 126 residences and within 1,000 feet of the area of land control. The nearest home to the solar facility is located on the east side of 70th Avenue SE, approximately 124 feet from the fence line of Unit 1 and 220 feet from the fence line of Unit 7.[54] In addition to nearby homes, Saint Marcus Cemetery in Clear Lake is located approximately 300 feet north of the northern fence line for Unit 1.[55]

4.3.1.1 Potential Impacts

The visible elements of the solar facility will consist of new PV arrays, up to eight weather stations, and new agricultural fencing surrounding each of the units.

[54] SPA, p. 50
[55] Xcel Energy, Comments, December 21, 2023, eDocket no. 202312-201477-01

The project will be a noticeable change in the landscape, converting approximately 1,300 acres of agricultural fields into solar production. Although the change will be noticeable, it will not be a new type of landscape feature in the project area. There are many small solar facilities in the project area, as well as the 460 MW Sherco Solar Project currently under construction (Figure 8), the project is much larger than existing solar facilities. How an individual viewer perceives the change from a field of corn to a field of solar panels depends, in part, on how a viewer perceives solar panels. Will the viewer consider the harvesting of solar energy to be like harvesting crops or will the viewer see an agricultural use be replaced by an industrial use?

For residents outside the project vicinity and for others with low viewer sensitivity, such as travelers along U.S. Highway 10 or Minnesota State Highway 24, aesthetic impacts are anticipated to be minimal. For these viewers, the solar panels would be relatively difficult to see or would be visible for a very short period. For residents in the project vicinity and for others with high viewer sensitivity traveling on local roads in the project vicinity, aesthetic impacts are anticipated to be moderate to significant.

Current fields of corn, soybeans, and potatoes will be replaced with acres of solar panels. At 20 feet tall at maximum tilt, panels will have a relatively low profile.[56] For reference, center pivot irrigation systems, which are present in the project landscape, are usually 14 to 18 feet in total height, with the sprinkler drop heads between seven and nine feet tall. The inverter skid sheds would be visible during certain times of day (mid-day), but when the panels are at full tilt, the sheds would likely be obstructed from view.

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

Down-lit security lighting will be installed at the gates to each unit. The gate lighting will be manually operated when needed and motion activated if an intrusion is detected. Down-lit switch controlled lights will be installed at each inverter for maintenance and repair. Lighting and various locations along the fence line for safety and security. Lighting will be motion-activated and down lit to minimize impacts and effects.[57] 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

[56] SPA, p. 19
[57] SPA, p. 25.

Section 4.3.8 of the DSP (**Appendix C**) requires the permittee to consider landowner input with respect to visual impacts and to use care to preserve the natural landscape.

Site-specific landscaping plans can minimize visual impacts to adjacent land uses and homes through vegetation screening, berms, or fencing. Xcel Energy has not proposed a screening plan but indicates that it will work with adjacent landowners to determine the need for landscaping to disrupt the line of site between the Project and nearby residences and the Saint Marcus Cemetery. Section 5.1 of the DSP is a special condition requiring the permittee to develop a site-specific Visual Screening Plan.

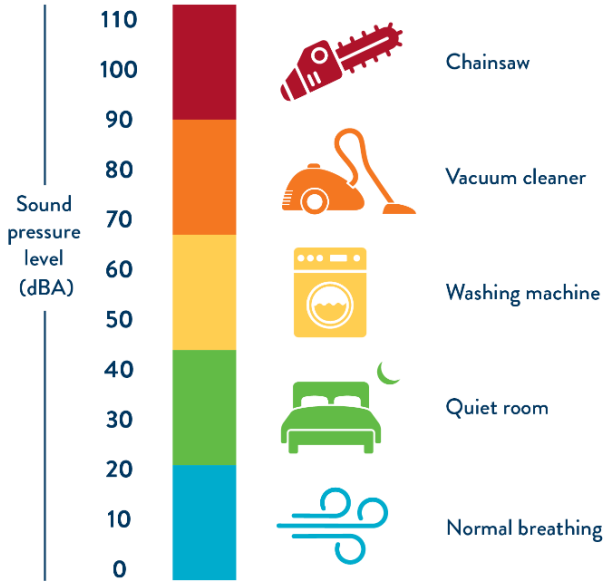
Aesthetic impacts can also be mitigated through individual agreements with neighboring landowners (sometimes referred to as good neighbor agreements). Such agreements are not within the scope of this EA.

4.3.2 Noise

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

Noise can be defined as any undesired sound. It is measured in units of decibels on a logarithmic scale. The A-weighted scale ("dBA") is used to duplicate the sensitivity of the human ear.[58] 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 9 provides decibel levels for common indoor and outdoor activities.[59]

Figure 9. Common Noise Levels



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

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

In Minnesota, noise standards are based on *noise area classifications* ("NAC") corresponding to the location of the listener, referred to as a receptor. NACs are assigned to areas based on the type of land use activity occurring at that location. Household units, designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3. A complete list is available at Minnesota Rule 7030.0050.

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 8 provides current Minnesota noise standards.

Table 8. Noise Area Classifications (dBA)

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

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

Potential Impacts

The primary noise receptors are the local residences. Although there are no residences within the site, there are 126 residences in local proximity (within 1000 ft)[60]. The proposed project is in a rural, agriculturally dominated area. According to the American National Standards Institute/Acoustical Society of America S12.9-2013/Part 3, rural residential areas have a typical daytime noise level of 40 dBA and a typical nighttime level of 34 dBA.[61] Residences are in NAC 1. Noise receptors could also include individuals working outside in the project vicinity. Potential noise impacts from the project are associated with construction noise and operational noise.

Construction Noise from construction will be temporary in duration, limited to daytime hours and potentially moderate to significant depending in location. Sound levels from grading equipment are not dissimilar from the typical tractors and larger trucks used in agricultural communities during

[60] SPA, at Appendix E.
[61] SPA, p. 47.

harvest. Pile driving of the rack supports will be the most significant source of construction noise. The applicant modeled noise from the pile drivers to be 68 dBA at 50 feet (the minimum setback from neighboring property lines).[62] The noise from construction activities would dissipate with distance and be audible at varying decibels, depending on the locations of the equipment and receptor.

Thus, this construction noise would exceed state noise standards at select times and locations. Exceedances would be short-term and confined to daytime hours. Even without an exceedance, noise impacts will occur. Rhythmic pounding of foundations posts would be disruptive even if the noise associated with that activity is within state standards.

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

Operation Noise levels during operation of the project are anticipated to be negligible. The primary source of noise from the solar facility will be from inverters, transformers, and the project substation. Noise levels are expected to be constant throughout the day and lower during non-daylight hours. The applicant modeled a maximum daytime noise level of 50 dBA within 26 feet from the inverter. For residential areas, there is an expected level of 26 dBA within 598 feet, the distance of the nearest home to an inverter, well below the daytime L_{50} dBA noise standard of 60 dBA and the nighttime standard of 50 dBA.[63] Noise from routine maintenance activities is anticipated to be negligible to minimal. Noise from the electrical collection system is not expected to be perceptible.

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

4.3.3 Cultural Values

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

Cultural values can be defined as shared community beliefs or attitudes that define what is collectively important to the group. These values provide a framework for individuals and community thought

[62] SPA, p. 28.
[63] SPA, p. 49.

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 in the project area derive primarily from European ancestry. Cultural values are also informed by work and leisure pursuits, for example, farming and snowmobiling, as well as land use, such as agricultural cropland. Community events in the project area are usually tied to geographic features, seasonal/municipal events, and national holidays.

The *Sherburne County 2040 Comprehensive Plan* identifies the rapid population growth and the tension between residents who see the county as a suburban extension of the Twin Cities and St. Cloud metropolitan area and those the view the county as more rural or agricultural. The plan also notes the increased development pressure on the western portion of the county, which has maintained a more agricultural identify. The plan specifically notes the impact of solar development, both utility-scale solar such as the Sherco Solar projects and community-scale solar, as one, though not the only, factor influencing the evolution of farming in the area. The Comprehensive Plan includes a section on energy transition, noting that "It is the County's policy to support the efficient use of existing and new energy resources to balance the needs of business, residents and the environment."[64]

POTENTIAL IMPACTS

The project contributes to the growth of renewable energy and the transition from fossil-fuel plants such as the Sherco coal plant in Becker to solar generation and is likely to strengthen and reinforce this value in the area. At the same time, the development of the project will change the character of the area. The value residents put on the character of the landscape within which they live is subjective, meaning its relative value depends upon the perception and philosophical or psychological responses unique to individuals. Because of this, construction of the project might—for some residents—change their perception of the area's character thus potentially eroding their sense of place. This tension between infrastructure projects and rural character creates real tradeoffs.

MITIGATION

There are no conditions included in the DSP that directly address mitigation for impacts to cultural values. No 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. Land use impacts are anticipated to be long-term and localized. The proposed solar

[64] Sherburne County *Sherburne County 2040 Comprehensive Plan*. (2023) https://www.co.sherburne.mn.us/DocumentCenter/View/353/Comprehensive-Land-Use-Plan-PDF f

facility is generally consistent with local land use ordinances and the Sherburne County's Comprehensive Plan. 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.

The National Land Cover Database provides "spatial reference and descriptive data for characteristics of the land surface" nationwide.[65] The land cover within the proposed solar facility site (The solar facility is located in the Anoka Sand Plan Subsection of the Eastern Broadleaf Forest Province. Prior to European settlement vegetation in the project area was primarily oak barrens and openings, with characteristic trees being bur oak and northern pin oak. Species associated with oak openings and barrens are found to be abundant, however large areas of these species are uncommon. Current land-use in the project area is predominately agricultural. The land control area is dominated by cultivated crops established and maintained by humans.

Table 9,) is dominated by cultivated agriculture, with scattered areas of pasture and developed areas around farmsteads.

Land use is the characterization of land based on what can be built on it and how the land is used. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. Land cover documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types, including wetlands. Construction of solar generating facilities and transmission line will alter current and future land use and land cover.

Table 9. Land Cover

Category	Solar Units (Acres)	Collection Corridors (Acres)	Percentage
Developed, Open Space	26.9	2.2	1.6%
Developed, Low Density	23.8	9.7	1.9%
Developed, Medium Density	8.2	1.5	0.5%
Developed, High Density	0.2	0.1	<0.1%
Emergent Herbaceous Wetlands	5.5	0.4	0.3%
Woody Wetlands	0.2	N/A	<0.1%
Open Water	1.8	<0.1	0.1%
Deciduous Forest	1.7	9.3	0.1%
Mixed Forest	1.2	<0.1	0.1%
Barren Land	0.1	N/A	<0.1%

[65] U.S. Geological Survey. *The National Land Cover Database*. (February 2012), retrieved from: http://pubs.usgs.gov/fs/2012/3020/fs2012-3020.pdf.

Shrub/Scrub	0.5	N/A	<0.1%
Herbacious	<0.1	N/A	<0.1%
Hay/Pasture	39.4	84.5	2.4%
Cultivated Crops	1570.0	84.5	92.9%
Total	1680.0	101.8	100%

A site permit from the Commission supersedes local zoning, building, or land use rules.[66] 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."[67]

The area of land control overlaps three zoning jurisdictions – Sherburne County, the City of Clear Lake, and Clear Lake Township. Sherburne County exercises zoning authority over land uses within Clear Lake Township. Units 1 and 2 are located in both the City of Clear Lake and Sherburne County zoning jurisdictions. Both Sherburne County and the City of Clear Lake have solar energy ordinances in their zoning ordinances. A zoning map showing the project is included in **Appendix B**.

The City of Clear Lake permits solar energy farms as an interim use within it's a-1 Agricultural District. Although portions of Units 1 and 2 are within the city of Clear Lake, the preliminary Project layout does not place any solar panels within the city limits.

Sherburne County Zoning Ordinance Section 17 (General Development Regulations), Subdivision 17 (Solar Energy Systems and Solar Energy Farms) addresses the development of solar farms within the general agricultural district; solar farms are not permitted within the Mississippi and Rum Scenic and Recreational River Districts.[68] Sherburne County permits solar farms as an interim use in much of the county, including Clear Lake Township where the Project is proposed. Locally permitted solar farms require a minimum setback of 50 feet from property lines and all other setback requirements of the underlying zoning district. Sherburne County also requires that solar farms comply with Minnesota and national equipment standards, stormwater management regulations and certain restriction for any facilities located within the shoreland overlay district.

Portions of Units 1 and 2 and collection corridor U02 are located within the Urban Expansion District. The Urban Expansion District is intended to provide for orderly development to facilitate potential future services (e.g., public sewer and water) while accommodating a semi-rural development pattern.

Sherburne County has a Shoreland Overlay District which covers land located within 1,000 feet from the ordinary high-water level of natural environment lakes listed in the Sherburne County Shoreland

[66] Minnesota Statutes 216E.10, subd. 1.
[67] Minnesota Statutes 216E.03, subd. 7.
[68] Sherburne County Zoning Ordinance Section 17 (General Development Regulations), Subdivision 17 (Solar Energy Systems and Solar Energy Farms), https://www.co.sherburne.mn.us/DocumentCenter/View/411/General-Development-Regulations-PDF

Ordinance.[69] Portions of Units 2, 8, and 9 and portions of the U02, U09, and the Homerun collection corridors are located within the Shoreland Overlay District.

The location of the site is within an "energy production" area in the Sherburne County Future Land Use Map.[70] The Energy Production designation is applied to large lots or parcels being used to supply energy; this designation applies to both utility-scale developments such as the Project and community-scale solar development.[71].

Potential Impacts

Development of solar farms in agricultural districts (Sherburne County and Becker Township) is a permitted use in Sherburne County and the city of Clear Lake. No solar facilities are proposed to be sited in Sherburne County's Recreation River District. The project's location within the Urban Expansion area is inconsistent with that land use if permitted locally. The Project is located within an area designated for energy production by Sherburne County.

Xcel Energy states that it will apply the structure setback to its facilities in a manner consistent with other permitted uses within the Shoreland Overlay District. Solar generating facilities are permitted in agricultural zoning provided the facility meets certain performance standards. Based on the preliminary project design, the project meets Sherburne County's performance standards.

Mitigation

The project would convert approximately 1,303 acres of cultivated cropland to solar energy production The DSP (**Appendix C**) has several permit conditions related to the preservation and restoration of agricultural land:

- Section 4.3.17 requires the applicant to prepare a vegetation management plan to prevent soil erosion and invests in soil health by establishing a plan to protect soil resources by ensuring perennial cover. The applicant's draft VMP is found in Appendix G 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 F 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 H of the site permit application.
- Section 9.2 requires removal of all project-related infrastructure.

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[69] Sherburne County Shoreland Overlay District. SECTION 14 - SHORELAND OVERLAY DISTRICT. SECTION 14 - SHORELAND DISTRICT (sherburne.mn.us). https://www.co.sherburne.mn.us/DocumentCenter/View/422/Shoreland-PDF

[70] Sherburne County, 2023 Future Land Use Map https://www.co.sherburne.mn.us/DocumentCenter/View/9456/2023-Future-Land-Use-Map-

[71] Sherburne County, 2040 Comprehensive Plan, at pp. 53 – 57, and Figure 4.1, Land Use Plan

Impacts to local zoning can be mitigated by ensuring the project is consistent, to the greatest extent practicable, with Sherburne County's performance standards for solar farms. The Project is consistent with performance standards for solar farms.

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.[72]

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

Large solar facilities exist in Minnesota; however, limited sales information is available. A review of the literature identified one peer-reviewed journal article that addressed impacts to property values based on proximity to utility-scale, PV solar facilities. The Lawrence Berkeley National Lab studied over 1,500 large-scale PV solar facilities in six states (including Minnesota) to determine whether home

[72] 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/.

sale prices were influenced within 0.5 miles (from over 1.8 million home sale transactions).[73] In summary, the study found that effects, "on home sale prices depend on many factors that are not uniform across all solar developments or across all states."

In Minnesota in particular, the study found that homes within one-half mile of large-scale PV solar facilities had a 4 percent reduction in home sale prices compared to homes 2-4 miles away. This finding was considered statistically significant. Additionally, only large-scale PV solar facilities developed on previously agricultural land, near homes in rural areas, and larger facilities (roughly 12 acres or more) were found to be linked to adverse home sale price impacts within one-half mile. The analysis did not include consideration of site features or site design, for example setbacks or landscaping features, which could play a role in nearby property valuation. Another limitation of the study was the lack of examination of the broader economic impacts or benefits to host communities from large-scale PV solar facilities, which might positively impact home sale prices.

Other studies with smaller sample sizes did not find a consistent negative impact to the sales value of properties near large solar facilities. Chisago County Environmental Services and Zoning found that home sales exceeded assessed value near the 100 MW North Star solar facility at a rate comparable to the general real estate market in the area. [74] 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.[75]

Potential Impacts

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

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

Mitigation

Impacts to property values can be mitigated by reducing aesthetic impacts and encumbrances to future land use. Section 5.1 of the DSP (**Appendix C**) is a special condition requiring the permittee to

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

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

[75] 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 Interviews, November 21, 2021, https://www.linncountyiowa.gov/DocumentCenter/View/18016/Real-Estate-Adjacent-Property-Value-Impact-Report-PDF?bidId=

develop a site-specific Visual Screening Plan. Impacts can also be mitigated through individual agreements with neighboring landowners. Such agreements are not within the scope of this EA.

4.3.6 Tourism and Recreation

The ROI for recreation is the local vicinity and the ROI for tourism is the project area. Potential impacts to recreational opportunities and tourism are anticipated to be minimal. During construction, unavoidable short-term impacts will occur as. construction equipment and vehicle traffic will create noise, dust, and visual impacts. These impacts will be intermittent and localized. Operational impacts will be long-term and are primarily associated with visual impacts caused by new built features introduced to the landscape. Because direct long-term impacts are primarily aesthetic in nature, indirect long-term impacts to recreation are expected to be subjective and unique to the individual. Potential impacts can be minimized

In 2022 the leisure and hospitality industry in Sherburne County accounted for about $142,5 million in gross sales, and 2,607 private sector jobs.[76] Tourism in the project area is largely related to recreational activities including bird watching, fishing, hunting, boating, golfing, and snowmobiling. Activities in the project area are associated with watercourses, wildlife management areas (WMAs), Scientific and Natural Areas (SNAs), snowmobile trails, golf courses, and county and city parks.

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

There are no WMAs or state parks withing one mile of the land control area. The Clear Lake SNA is located approximately one-half mile northwest of Unit 3. Clear Lake Township Park and Goenner Parm are both within one mile of the area of land control. The Mississippi River is located approximately 1,800 feet southwest of the site boundary at the nearest point. The nearest public water access point is approximately on-half mile west of Unit 3, northwest of County Road 4.

Sherburne County Snowmobile Trail 209 crosses Units 1, 3 and 7 for a total of approximately 2.2 miles and also crosses the home run collection corridor.[77]

POTENTIAL IMPACTS

Impacts to recreation are anticipated to be minimal and temporary. Construction of the project will require Snowmobile Trail 209 to be re-routed outside the fenced area of the solar facility. The PV panels will be visible to users of the re-located snowmobile trail, but their presence is not anticipated to significantly impact users of the trail.

MITIGATION

Xcel Energy has coordinated with the Sherburne County Snowmobile Trail Association regarding reroutes for trails impacted by the Sherco Solar project currently under construction in Clear Lake and

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

[77] SPA, p. 55 Exhibit 6

Becker townships and indicates it will continue to coordinate with the Association to develop temporary and permanent reroutes for the project.

Section 5.2 of the DSP (**Appendix C**) is a special condition requiring the permittee to coordinate with the snowmobile trail association to reroute Snowmobile Trail 209. 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: The project area is not serviced by city water supply or sanitary sewer and residents in the project area have private wells for domestic water needs and private septic systems of drain fields for domestic wastewater.

Electric Utilities: The primary electric provider in the project area is Xcel Energy. As shown in Figure 8, there are several high voltage transmission lines (greater than 100 kV) in the Project area, including a 115 kV line that bisects units 3, 4, and 5. In addition to the lines shown in Figure 8, a number of 69 kV transmission lines are within and near units 1, 2, 6,7, 8, and 9:

- A 69 kV transmission line that parallels U.S. Highway 10 on the south side that is within Unit 2 and Unit 8.
- A 69 kV transmission line that parallels 80th Ave (CR 58) along the east side that is within Unit 2.
- A 69 kV transmission line that parallels 117th St (CSAH 8) along the north side that is within Unit 6.
- A 69 kV transmission line that parallels State Highway 24 along the southeast side that is within Unit 1 and Unit 7.
- A 69 kV transmission line that parallels 87th St (CR 56) along the south side that is within Unit 9.

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

Pipelines: Xcel Energy provides natural gas service in the project area. There are no mapped pipelines within the area of land control.[78]

[78] SPA, p 63

Roads: The major roadways accessing the project area are U.S. Highway 10, which is north of units 1 – 8, and south of Unit 9 and Minnesota Highway 24, which is west of the Project and bounds Units 1, 7, and 3.[79]

Railroads: Route 388 of the Burlington Norther Santa Fe (BNSF) Railroad parallels the south side of US Highway 10 near the site, passing through Clear Lake, and connecting to the BNSF Rail Loop near the Sherco Power Plant. Although the BNSF Railroad is near Unit 8, it is separated by a road and does not cross any portion of the site.

Airports: There are seven Federal Aviation Administration (FAA)-registered airports in Sherburne County. The nearest FAA-registered airport to the Project is the Leaders Clear Lake airport located approximately 0.2 mile north of Unit 8 of the Project. This privately-owned airport operates one runway with an asphalt-turf surface. In order to assure safety, both the FAA and MnDOT office of Aeronautics have established guidelines for the location of structures near airports. The FAA has height restrictions for development near public airports and guidelines for placement of buildings and other structures near high frequency omnidirectional range navigation systems. MnDOT has zoning areas around public airports that restrict the area where buildings and other structures can be placed.

POTENTIAL IMPACTS

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

Water and Wastewater: Xcel Energy will not install any wells or septic systems for drinking water or sanitary services. The O&M facility will be located at the existing Sherco Generating Plant. [80]

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 275 – 350 pickup trucks, cars, and/or other types of employee vehicles onsite during construction. Approximately 30 – 40 semi-trucks per day will be used for delivery of facility components. Construction traffic will be perceptible to area residents, but because the average daily traffic on the area is well below design capacity, this increased traffic is not expected to affect traffic function. Slow-moving construction vehicles may also cause delays on smaller roads, similar to the impact of farm equipment during planting or harvest. However, these delays should be minimal for the relatively short construction delivery period. Xcel Energy states that overweight or oversized loads are "unlikely," but will obtain appropriate approvals for these loads prior to construction. [81]

[79] SPA, at pp. 64 – 66,
[80] SPA, p. 25
[81] SPA, p. 67 - 68

With the exception of minor field access or driveway changes, no changes to the existing public roads are anticipated.[82] Access to the project will be through locked gates off 70th Avenue SE, 80th Avenue SE (CR 58), CR 8, 90th Avenue SE, and CR 56 (87th Street and 100th Avenue).[83]

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

The collection corridors will cross several roads including US Highway 10, Sherburne CR 8, 80th Avenue Southwest, and 90th Avenue Southwest. The project design anticipates that all collection corridors, including road crossings, will be buried between the fenced areas and the Sherco Solar West Substation. Applicants indicate that they will coordinate with local authorities and MnDOT to minimize impacts to roadways, and that road crossings. MnDOT had indicated that entry and exit points for buried crossings of US Highway 10 will need to occur outside of MnDOT ROW.[84]

Railroads: No impacts to railroads are anticipated. Xcel Energy will require a Utility Agreement License from BNSF railroad to bore collection lines beneath railroad property. [85]

Electric Utilities: No long-term impacts to utilities will occur because of the project. The Project will not impact existing transmission lines, and Xcel Energy indicates it does not anticipate any customer outages during construction of the Project and connection to the Sherco West Substation

Air Safety: The applicant used the FAA's Notice Criteria Tool for a total of 38 points around the perimeter of each unit to determine if further aeronautical study or FAA filing is needed. FAA's screening tool indicated that two points associated with Unit 8 (at the northeast and Norwest corners of the unit) are in proximity to a navigation facility and require further evaluation to determine whether there is potential to impact navigation signal reception. Xcel Energy filed the required FAA Form 7460-1 for the two points. An FAA determination was not complete at the time this document was prepared.

MITIGATION

Water and Wastewater: A well construction permit from the Minnesota Department of Health (MDH) would be required if a well is installed at the facility in the future.

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

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

The location of underground utilities can be identified using the Gopher State One Call system during engineering surveys and marking the underground utility locations prior to construction. If a utility is

[82] SPA, p. 67
[83] SPA, pp. 65 – 66
[84] MnDOT Comment, November 22, 2024, eDocket no. 202311-200722-01
[85] SPA, p. 67, p. 119 - Table 5-1

identified, the project component or the utility itself might need to be relocated if it cannot be successfully crossed. Relocation, as well as any necessary crossing, would need to be coordinated with the affected utility.

Roads: Changes or additions to driveways from county roads will require permits from the county. MnDOT indicates that crossing of US Highway 10 will require early and ongoing coordination with MnDOT and may require a Utility Accommodation on Trunk Highway Right-of-Way Permit.[86]

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

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

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

Railroads: As no impacts to existing railroads are anticipated, no mitigation is proposed.

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.

Sherburne County is growing faster than Minnesota as a whole; between 2000 and 2020, the population in Sherburne County grew by nearly 51 percent, compared to 15.9 percent for Minnesota as a whole. The population of Clear Lake has increased by 141 percent over the same time period. Sherburne County in has a lower minority population than the state as a whole and higher median household incomes (Table 10).

In 2022 the sectors with the largest employment in Sherburne County were educational services, health care, and social assistance sector (24.6 percent), manufacturing (13.4 percent) and construction (12.9 sectors).[87] Sherburne County is part of the Minnesota Department of Employment and Economic Development Region 07W, which is the Central Economic Development Region. Unemployment rates fluctuate with the economy, but the unemployment rate for Region 7W has been consistently similar to the state, typically slightly above, but within 0.2%, of Minnesota's

[86] MnDOT Comment, November 22, 2024, eDocket no. 202311-200722-01
[87] American Community Survey, 2022

unemployment rate.[88] In 2022, Sherburne County had a slightly lower unemployment rate (3.0%) than the state average (4.0 %). The county also had a higher labor force participation rate (73.5%) than Minnesota as a whole (68.7%).[89]

Table 10. Population Characteristics

Area	Total Population				Population Characteristics***		
	2000 Census*	2020 Census*	% Change 2000 - 2020	2022 Estimate **	% Minority‡	Median Household Income ($)	% Below Poverty Level
Minnesota	4,919,479	5,706,494	15.9	5,801,769	22.3	84,313	9.3
Sherburne County	64, 417	97,183	50.9	102,275	12.2	99,431	5.8
Clear Lake City	266	641	141.0	666	0.3	105,724	N/A
Clear Lake Township	1,595	1,675	5.0	1,706	4.4	95,461	N/A

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

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

*** 2022 American Community Survey 5-year estimates

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

Potential Impacts

The impact intensity level is anticipated to be positive. Potential impacts associated with construction will be positive, but minimal and short-term. Significant positive effects might occur for individuals. Impacts from operation will be long-term, positive, and moderate. The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority 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. The applicant indicates that procurement of construction resources will give preference to women, veteran, and minority owned business contractors. The applicant anticipates creating nearly 490 union temporary construction jobs, providing an estimate $62.5 million in wages. The applicant expects general skilled

[88] Minnesota Department of Economic Employment and Development (DEED). *Economic Development Region 7W: Central, 2023 Regional Profile*. (2023), https://mn.gov/deed/assets/031124_Region7W_tcm1045-133247.pdf

[89] DEED. County Profiles for Sherburne County. (2024) https://mn.gov/deed/assets/021224_sherburne_tcm1045-407421.pdf

labor to be available in Sherburne County or Minnesota to serve the basic infrastructure and site development needs, with specialized labor being required for certain aspects of the project.[90]

Once the project is operational, Xcel Energy 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.[91] Minnesota has adopted a production tax of $1.20/MWh paid 80 percent to counties and 20 percent to the cities and townships.[92] Xcel Energy estimates that the project will create a state and local benefit of $129 million total, with $90 million in landowner payments, $20 million in state and local property taxes, and local production tax revenues of approximately $19 million over the life of the project.[93] In addition, lease and purchase payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.

The applicant anticipates the project will require approximately 490 jobs during the construction and installation phases, and up to 18 long-term personnel during the operations phase. Indirect economic benefits will occur from additional local spending on lodging, goods and services and local sales tax.[94]

If the project is constructed, approximately 1300 acres will be removed from agricultural production that currently used to produce corn and soybeans. The removal of cultivated land is likely to result in an incremental decrease to agricultural-related businesses, such as farm dealerships, seed dealers, and dealers of agricultural inputs such as fertilizer and pesticides, in the area. The extent of any decrease in sales is difficult to determine, but the removal of approximately 1.5 percent of the approximately 85,044 acres of farmland in Sherburne County is unlikely to have a significant impact. Adverse impacts associated with the loss of agricultural land and agricultural production will be mitigated through lease payments to landowners.

MITIGATION

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

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[90] SPA, p. 53

[91] 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 .

[92] *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

[93] SPA, p. 53

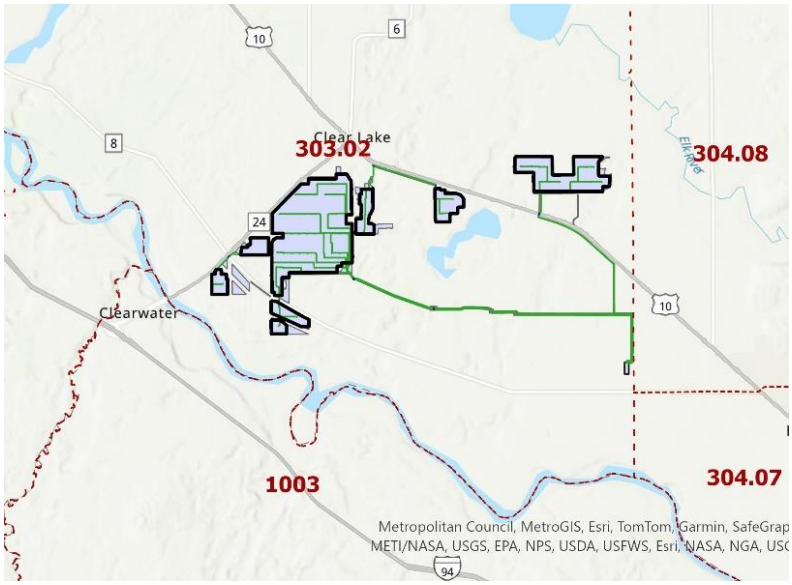
[94] SPA, p. 53

4.3.9 Environmental Justice

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

Environmental justice is "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[95] The goal of this "fair treatment" is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.[96]

Figure 10. Census Tracts in Project Area



POTENTIAL IMPACTS

Utility infrastructure can adversely impact low-income, minority or tribal populations. To identify potential environmental justice concerns in the project area, the US EPA's EJ Screening Tool was used to consider the composition of the affected area to determine whether low-income, minority or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations.[97] Low-income and minority populations are determined to be present in an area when the low-income percentage or minority group percentage exceeds 50 percent or is "meaningfully greater" than in the general population. In this analysis, a difference of 10 percentage points or more was used as the threshold to distinguish whether a "meaningfully greater" low-income or minority population resides in the ROI.

Staff conducted a demographic assessment of the affected community to identify low-income and minority populations using U.S. Census data. Table 11 provides low-income and minority population data and Figure 10 shows the census tract used to compare the project area with Sherburne County.

[95] US EPA Environmental Justice, https://www.epa.gov/environmentaljustice .
[96] US EPA, Guidance for Incorporating Environmental Justice Concern in EPA's NEPA Compliance Analyses (pdf),
[97] US EPA EJ Screen, https://www.epa.gov/ejscreen..

Table 11 Low-Income and Minority Population Characteristics

Area	% Below Poverty Level	Median Household Income ($)	% Minority Population‡
Region of Comparison			
Minnesota	9.3	$84,313	22.3
Sherburne County	5.8	9$9,431	12.2
Project Census Tracts			
030408	1.5	$126,442	2.0
030302	3.4	$99,625	4.1

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

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

MITIGATION

The project will not create disproportionate or adverse impacts to low income or minority populations because the low-income or minority residents of the project area not a meaningfully greater than the area of comparison. Mitigation is not proposed.

4.4 Human Health and Safety

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

4.4.1 Electronic and Magnetic Fields

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

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

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

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

Table 12 provides examples of electric and magnetic fields associated with common household items. "The strongest electric fields that are ordinarily encountered in the environment exist beneath high voltage transmission lines. In contrast, the strongest magnetic fields are normally found very close to motors and other electrical appliances, as well as in specialized equipment such as magnetic resonance scanners used for medical imaging."[98]

Table 12. Electric and Magnetic Field Strength of Common Household Objects[99]

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."[100]

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

[98] 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
[99] Ibid.
[100] 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

ionize molecules or to heat them.[101] Nevertheless, they are fields of energy and thus have the potential to produce effects.

"The few studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer."[102] "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."[103]

"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."[104]

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.[105]

Regulations and Guidelines Currently, there are no federal regulations regarding allowable ELF-EMF produced by power lines in the United States; however, state governments have developed state-specific regulations. For example, Florida limits electric fields to 2.0 kV/m and magnetic fields to 150

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

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

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

[104] 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.

[105] *Id*., page 36.

mG at the edge of the ROW for 161 kV transmission lines.[106] Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (Table 13)

Table 13. 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

POTENTIAL IMPACTS

Potential impacts are anticipated to be negligible and are not expected to negatively affect human health. Impacts will be long-term and localized but can be minimized. The primary sources of EMF from the generating facility will be from the solar arrays, buried electrical collection lines, and the transformers installed at each inverter. The EMF generated by solar arrays is at the level generally experienced near common household appliances. Measured magnetic fields at utility-scale PV projects drop to very low levels of 0.5 mG or less at distances of 150 feet from inverters.[107]

MITIGATION

No health impacts from EMF are anticipated. EMF diminishes with distance from a conductor or inverter. The nearest inverter is located approximately 600 feet from the nearest home and the nearest 34.5 kV collector line is approximately 200 feet from the nearest residence. At this distance both electric and magnetic fields will dissipate to background levels. No additional mitigation is proposed.

4.4.2 Public Safety and Emergency Services

The ROI for public and work safety is the land control area. Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Public risks involve electrocution. Electrocution risks could also result from unauthorized entry into the fenced area. Potential impacts are anticipated to be minimal. Impacts would be short- and long-term and can be minimized.

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[106] 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.

[107] 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

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

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

Emergency services in the project area are provided by local law enforcement and emergency response agencies located in nearby communities. Law enforcement in the project area is provided by the Sherburn County Sheriff, and the police departments of Becker, Big Lake, and Elk River. Fire service is provided by the Clear Lake Fare and rescue Department, Becker Fire Department, Monticello Fire Department, Big Lake Fire Department, and Elk River Fire Department. Ambulance response is provided by local ambulance services out of Big Lake, Elk River, Princeton, and Saint Cloud. The largest nearby hospital is in Saint Cloud, with other hospitals and clinics located in Monticello, Elk River, and Princeton.

Potential Impacts

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

The inflow of temporary construction personnel could increase demand for emergency and public health services. On the job injuries of construction workers requiring assistance due to slips, trips or falls, equipment use, or electrocution can create a demand for emergency, public health, or safety services that would not exist if the Project were not to be built. Although no road closures are anticipated during construction,[108] any temporary closures could impede police, fire, and other rescue vehicles access to the site of an emergency.

In Minnesota, unless solar panels discarded by commercial entities are specifically evaluated as non-hazardous assumed, 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.[109]

Mitigation

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

Construction is bound by federal and state Occupational Safety and Health Administration (OSHA) requirements for worker safety, and must comply with local, state, and federal regulations regarding installation of the facilities and qualifications of workers. Established industry safety procedures will

[108] SPA, p. 71

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

be followed during and after construction of the project. Crews will be trained and briefed on safety issues, reducing the risk of injury. The project will be fenced to prevent unauthorized access The periodic updates of the decommissioning plan required under

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

- Section 4.3.29 requires the permittee to take several public safety measures, including landowner educational materials, appropriate signs and gates, etc.
- Section 8.11 requires permittees file an *Emergency Response Plan* with the Commission and local first responders prior to operation.
- Section 8.12 requires disclosure of extraordinary events, such as fires, etc.
- Section 9.1 requires a decommissioning plan prior to construction and updated every five years. Periodic updates of the plan will address the developing information on end-of-life issues related to PV panels.

No additional mitigation is proposed.

4.5 Land-based Economies

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

4.5.1 Agriculture

The ROI for agriculture is the land control area. Potential impacts to agricultural producers are anticipated to be minimal—lost farming revenues will be offset by lease or easement agreements. A loss of farmland in Sherburne County would occur for the life of the project. Unlike many other solar generating facilities proposed in Minnesota, there is no prime farmland within the site or collector corridors. Potential impacts are localized and unavoidable but can be minimized.

Agricultural use dominates the area of land control, with approximately 93 percent of the area used for cultivated row crops (corn, soybeans, and potatoes are the dominant crops) and another 2.4 percent used for hay and pasture. Much of the row crops in the area of land control are irrigated with central pivot irrigation.

In 2022, there were approximately 85,044 acres of farmland in Sherburne County, comprising approximately 31 percent of all land in the county. This represents a decrease of approximately 17 percent in total agricultural acreage since 2017. By acreage, the largest crops are corn, soybeans, vegetables, and potatoes. Sherburne County is the largest producer of vegetables, including potatoes, in Minnesota. Cattle is the largest livestock category. [110]

Prime farmland is defined by Federal regulation at 7 C.F.R.657.5(a)(1) “is 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.” There are no soils classified as prime farmland within

[110] United States Department of Agriculture, 2017 Census of Agriculture, County Profile: Sherburne County, Minnesota, https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27141.pdf

the solar facility or collector corridor. There are approximately 20 acres of soils classified as "Farmland of Statewide Importance."[111]

Potential Impacts

The impact intensity level will range from moderate to significant. The intensity of the impact is likely to be subjective. For example, conversion of farmland to energy production can be viewed as a conversion from one type of industrial use to another. Conversely, the conversion of farmland to 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 1300 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 1.5 percent of existing agricultural land in Sherburne County. The applicant indicates that the land could be returned to agricultural uses after the project is decommissioned and the site is restored.

There are a number of center-pivot irrigation systems within the solar facility and collection corridors. Systems within the solar facility will be decommissioned, with the water and utility lines left in place. There is a potential for damage to irrigation systems along the collector corridors during construction.

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

Mitigation

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

- Section 4.3.9 requires protection and segregation of topsoil.
- Section 4.3.10 requires measures to minimize soil compaction.
- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls to ensure that stormwater does not become a problem on or off-site.
- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".
- 4.3.17 requires the permittee to develop a VMP that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Xcel Energy has included a draft VMP as Appendix G of its site permit application.

[111] SPA, p. 82

- Section 4.3.18 requires the permittee to develop an AIMP with MDA. Xcel Energy's draft AIMP (Appendix F of its site permit application) details methods to minimize soil compaction, preserve topsoil, control noxious weeds and invasive species, maintain the existing drainage conditions through appropriate maintenance and repair of existing drain tile, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.
- Section 4.3.20 requires the permittee to develop an Invasive Species Management Plan to prevent introduction and spread of invasive species during construction of the project.
- Section 4.3.21 requires the permittee to take reasonable precautions against the spread of noxious weeds.
- Section 4.3.28 requires the permittee to fairly restore or compensate landowners for damages to crops, fences, drain tile, etc. during construction.

Xcel Energy indicates it will promptly repair damage to center-pivot irrigation systems along the collection corridors that are inadvertently damaged during construction.

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

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 siting and routing.

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.[112] Historic resources are sites, buildings, structures, or other antiquities of state or national significance.[113]

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

Xcel Energy reports contacting 27 tribes, including the eleven Minnesota Tribal Nations' Tribal Historic Preservation Officers and the Minnesota Indian Affairs Council for additional information or comment on the project.[114] The Milles Lacs Band of Ojibwe Natural Resources Department filed comments noting that the Project is located near an area of historical significance due to disputes between the Dakota and Ojibwe in 1772 and 1773. This area is called Miigaadiwining (At the "Battling") in Ojibwe.

[112] Minnesota Statutes, Section. 138.31, subd. 14.
[113] Minnesota. Statutes, Section 138.51.
[114] SPA, at pp. 111-112, Table 4.1

Studies of the area have recorded 334 burial mounds in 26 groups in Sherburne County and 383 burial grounds in 57 groups in Wright County [115]

Xcel Energy conducted a Phase Ia literature review to identify previously recorded archaeological and historic architectural resources within and near the Project. This Phase Ia review examined records from the Minnesota State Historic Preservation Office (SHPO) and Minnesota Office of the State Archeologist for an area within one mile of the area of land control. Units 1 and 2 were surveyed in 2020 and units 3 – 9 were surveyed in 2023.

The literature review identified one artifact within the site, a lead bullet in Unit 5. The review also identified one cemetery, the Lee Pioneer Burial, adjacent to the western border of Unit 5. Four additional sites have been recorded within one mile of the land control area.

The literature review identified 83 historic/architectural resources within one mile of the area of land control, none located within the site. Most of these resources are within the city of Clearwater (58 records) located southeast of the Project and in the city of Clear Lake (10 records) located northeast of the Project. The three NRHP-listed architectural resources are all located at least 0.9 miles from the area of land control. In addition to the architectural resources, Trunk Highway 10, located adjacent to units 8 and 9 of the Project. Westwood Engineering determined the project "will have no adverse effects to historic properties listed in, eligible for, or potentially eligible for listing in the NRHP." And recommended no [116] The SHPO concurred with Westwood Engineering's determination, stating "Therefore, based on information that is available to us at this time, we agree that there are no properties listed in the National or State Registers of Historic Places and no known or suspected archaeological properties in the area that will be affected by this project."[117]

MITIGATION

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

In addition to the standard permit condition, Section 5.3 of the DSP (**Appendix C**) requires preparation of an Unanticipated Discoveries Plan outlining steps to be taken if previously unrecorded cultural resources or human remains are encountered during construction.

The Milles Lacs Band of Ojibwe Natural Resources Department, noting the historical significance of the area and the presence of burial mounds, recommends that Tribal monitors be engaged during

[115] Mille Lacs Band of Ojibwe Department of Natural Resources, *Comment*, August 23, 2023, eDocket ID: 20239-198726-01
[116] SPA, Appendix I, p. 6
[117] Xcel Energy, Comments – SHPO Update Letter, December 13, 2023, eDocket no. 202312-201176-01, Attachment B

construction of the Project to minimize the potential for inadvertent discoveries of human remains.[118] Following receipt of the comments, Xcel Energy toured the project area with an archivist from the Milles Lacs Band of Ojibwe Natural Resources. Xcel Energy's summary of the visit indicates that, while the Band's representative did not note any immediate concerns following the tour, the representative indicated that a follow-up visit may be appropriate.[119]

A special condition requiring Xcel Energy to engage an independent third party tribal monitor to observe and monitor construction activities may be appropriate to minimize the potential for inadvertent discoveries of cultural resources or human remains.

4.7 Natural Resources

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

4.7.1 Air Quality

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

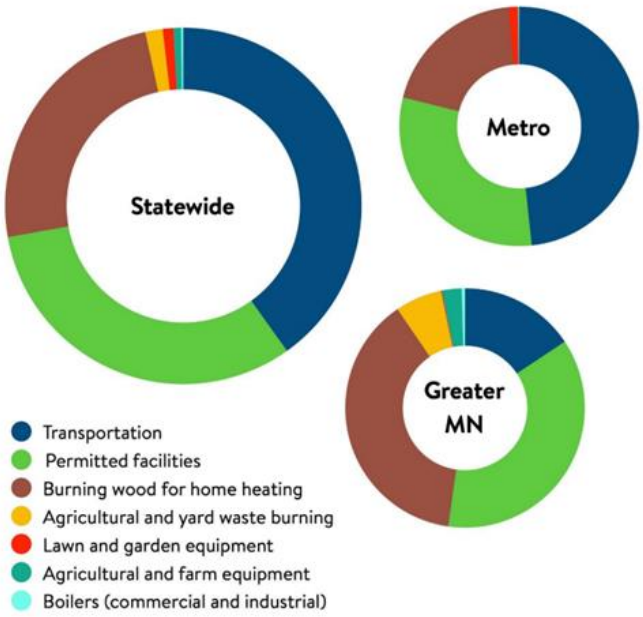
Air quality is a measure of how pollution-free the ambient air is and how healthy it is for humans, other animals, and plants. Emissions of air pollutants will occur during construction and operation of new infrastructure for the project. Overall air quality in Minnesota has improved over the last 20 years, but current levels of air pollution still contribute to health impacts. As illustrated in Figure 11**,** today, most of our air pollution comes from smaller, widespread sources … the rest comes from a wide variety of things we use in our daily lives: our vehicles, local businesses, heating and cooling, and yard and recreational equipment".[120]

The nearest air quality monitor to the project is in St Cloud, Minnesota. Air quality in the area has been considered "good" between 246 and 338 days of the year from 2012-2022. During the same time period, the number of days classified as moderate occurred varied between 27 and 73. Air quality was considered unhealthy for sensitive groups on one day in both 2012 and 2018 and three days in 2021. Air quality was classified as unhealthy on one day in 2015 and one day in 2021.[121] The increase

[118] Mille Lacs Band of Ojibwe Department of Natural Resources, *Comment*, August 23, 2023, eDocket ID: 20239-198726-01
[119] Xcel Energy, Comments - SHPO Update Letter, December 13, 2023, eDocket no. 202312-201176-01,
[120] MPCA *The State of Minnesota's Air Quality, January 2023 Report to the Legislature*, https://www.lrl.mn.gov/docs/2022/mandated/221697.pdf
[121] MPCA. *Annual AQI Days by Reporting Region*, https://public.tableau.com/app/profile/mpca.data.services/viz/MinnesotaAirQualityIndex_0/AQIExternal

in the number of days of moderate or worse air quality in 2021 was statewide and largely attributable to drought conditions and wildfire smoke in the upper Midwest. [122]

Figure 11. Air Pollution Sources by Type



Potential Impacts

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

Motorized equipment will emit exhaust. This includes construction equipment and vehicles travelling to and from the project. Exhaust emissions, primarily from diesel equipment, would vary according to the phase of construction.

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions. The project will generate fugitive dust from travel on unpaved roads, grading, and excavation.

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.

Mitigation

Exhaust emissions can be minimized by keeping vehicles and equipment in good working order, and not running equipment unless necessary.

[122] MPCA. The Air We Breathe: The State of Minnesota's Air Quality in 2021, 2023, https://www.lrl.mn.gov/docs/2022/mandated/221697.pdf p. 4,

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

The AIMP identify construction best management practices related to soils and vegetation that will help to mitigate against fugitive dust emissions. Several sections of the draft site indirectly mitigate impacts to air quality, including sections related to soils, vegetation removal, restoration, and pollution and hazardous wastes.

4.7.2 Geology and Groundwater

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

Groundwater in Minnesota is largely a function of local geologic conditions that determine the type and properties of aquifers. Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The project site is within the Province 1, the East-Central province, and is characterized by buried sand aquifers and relatively extensive surficial sand plains, part of a thick layer of sediment deposited by glaciers overlying the bedrock. Province 1 is underlain by sedimentary bedrock with good aquifer properties. These unconsolidated aquifers are and underlain by Paleozoic (sandstone and carbonate) and Precambrian (sandstone) aquifers. In this province, groundwater is typically derived from moderate extent surficial and buried sand aquifers.[123]

Pollution sensitivity of near surface materials in the project area ranges from “very low” to “moderate”, with the highest percentage largely in the “very low” category. 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.[124] This means that the project area is generally expected to have “very low” groundwater pollution sensitivity where contaminants from the land surface would not reach groundwater for months to a year.[125] 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.

If damage occurs to the PV panels, it is important that materials from the panels do not contaminate groundwater sources. Xcel Energy has provided TCLP (toxicity characteristic leaching procedure) testing reports for the materials contained within the PV panels.[126] TCLP testing is the EPA-approved method for determining whether a hazardous substance is likely to leach from solar panels into the ground and ground water. The test is designed to determine the mobility of both organic and inorganic

[123] DNR, Minnesota Groundwater Provinces (2021) https://www.dnr.state.mn.us/waters/groundwater_section/mapping/provinces.html
[124] 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.
[125] 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 .
[126] **Appendix D**, Response to Question 2

analytes present in liquid, solid, and multiphasic wastes.[127] The report showed two elements detected in waters and waste that appear below the US EPA limit of <5 mg/L for both elements, including 0.025mg/L of Lead and 0.053 mg/L of Silver. There were also trace elements of Cadmium, Chromium, and Selenium detected far below the USA EPA limits of <1, <5, and <1 respectively. Because all detected elements are below the EPA limits, they are considered to be non-hazardous. The testing document provided by the applicant confirmed that in the occurrence of destruction to a PV panel, it is unlikely that hazardous materials will leach into groundwater resources.[128]

Depth to groundwater in the preliminary development area ranges from just below the surface to more than 80 inches depending on the soil type.[129] Depth to groundwater is shallower in the mapped hydric soils and areas delineated as wetland, and deeper in the non-hydric soil units. In some of the areas with drain tile, depth to groundwater is altered and likely deeper than what's reported in the US Department of Agriculture's Web Soil Survey. The possibility of groundwater level fluctuations due to seasonal variations will be considered before final engineering and design.

The land control area was reviewed for EPA designated sole source aquifers, wells listed on the Minnesota Well Index (MWI) and MDH Wellhead Protection Areas (WHPAs).[130] The MDH maintains the Minnesota Well Index (MWI), which provides basic information (e.g., location, depth, geology, construction, and static water level) for wells and borings drilled in Minnesota.[131] The MWI identifies 20 verified and 3 unverified wells within the site.[132] It is presumed most of the wells within the area of land control provide water for center pivot irrigation and not for domestic water use

Under the Safe Drinking Water Act, each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. WHPA encompasses the area around a drinking water well where contaminants could enter and pollute the well. Public and non-public community water supply source-water protection in Minnesota is administered by the MDH through the Wellhead Protection program. WHPAs for public and community water-supply wells are delineated based on a zone of capture for 10-year groundwater time-of-travel to the well and are available through a database and mapping layer maintained by MDH (2023b). A search for WHPAs in the MDH database indicated that the land control area is located entirely outside of any WHPA. The nearest WHPA is the Clear Lake WHPA located 0.1 mile north of the land control area.

Potential Impacts

Potential impacts to geology and groundwater can occur directly or indirectly. Impacts to geological resources are likely to be minimal, due to the thickness of surficial materials (92 to 804 feet) and the absence of karst features.

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[127] EPA, SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure. https://www.epa.gov/hw-sw846/sw-846-test-method-1311-toxicity-characteristic-leaching-procedure

[128] **Appendix D**, Response to Question 2

[129] Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

[130] SPA, p.77

[131] MDH (n.d.) *Minnesota Well Index* https://www.health.state.mn.us/communities/environment/water/mwi/index.html .

[132] SPA, Exhibit 5 - Existing Infrastructure and AADT.

Direct impacts to groundwater are generally associated with construction, for example, structure foundations that could penetrate shallow water tables or groundwater usage. Indirect impacts could occur through spills or leaks of petroleum fluids or other contaminants that contaminate surface waters which could ultimately contaminate groundwater. The disturbance of soil and vegetative cover could affect water quality in groundwater resources. Impacts to groundwater resources, including aquifers and the Mississippi River, are not anticipated as water supply needs will be limited. The applicant estimates that 38.2 acres of impervious surface area will be created by project access roads and inverter skids,

Geotechnical and pull testing studies will be performed to determine the topsoil and subsoil types, and the mechanical properties of the soils. These variables will be used to engineer the solar array foundation system. Typically, the foundation is a steel pile, which is driven into the ground with a hydraulically powered high-frequency hammer mounted on a tracked carrier. The piles are installed at pre-defined locations throughout the array area to an embedment depth of approximately 8 feet to 14 feet below grade, depending on soil properties and other factors.[133] The applicant states that projects facilities are not likely to affect the use of existing water wells, because they do not anticipate impacting the ground deeper than 15 feet for the racking piers.[134]

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

Depending upon the results of geotechnical studies, PV foundations in some areas may require concrete foundations instead of driven piers.[135] If concrete foundations are used, some portion of the 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.[136]

Many of the fields within the site are currently irrigated by center-pivot irrigation systems. The water and utility lines servicing the irrigation systems within the developed area will be decommissioned and left in place. Xcel Energy may uncap existing wells or may install new wells if it identifies a need for water at the Project. Overall, groundwater use is expected to decrease from the current level at the Project.[137]

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

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[133] SPA, p. 31
[134] SPA, p. 77
[135] SPA, p. 78
[136] See Department of Commerce (May 14, 2018) *Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project,*: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/34748/1%20Text%20Figures%20Tables.pdf , pp. 66-67.
[137] SPA, Appendix F, AIMP, Section 4.6

at the site to reduce the volume and velocity of the stormwater runoff and the establishment of multiple stormwater ponds, will address drainage from the newly established impervious areas.

Geotechnical soil testing will determine final installation process for the foundation structures. Similarly, the exterior agricultural fence may require concrete foundations in some locations. If concrete is needed, it will be locally sourced; an on-site concrete batch plant will not be required for the project.[138]

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

A National Pollutant Discharge Elimination System (NPDES) permit application to discharge stormwater from construction facilities will also be acquired by Xcel Energy 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.[139]

Wells will be decommissioned or marked with flagging and a five-foot buffer fence to avoid impacting the wells. 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, Xcel Energy will cap and abandon the well in place in accordance with MDH requirements.

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

4.7.3 Soils

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

[138] SPA, p. 78
[139] SPA, p .78

facility will be covered with native perennial vegetation for the life of the project, soil health is likely to improve.

The soils deposited in the area (Table 14) are nearly level, deep, excessively drained course textured Mollisols. Topsoil in the land control area range from 4 – 18 inches and are not high in organic matter and are susceptible to wind erosion. The soils within the site generally have a low susceptibility to compaction or rutting during wet conditions due to the sandy texture of the soil. None of the soils are classified as prime farmland.

Table 14. Soil Types in Solar Facility Land Control Area[140]

Map Unit Name	Drainage Class	Surface Texture	Acres
Solar Facility			
Isan sandy loam, depressional, 0 to 1percent slopes	Very poorly drained	sandy	14.5
Mosford sandy loam, 0 to 2 percent slopes*	Somewhat excessively drained	sandy	20.4
Seelyeville-Markey complex, ponded, 0 to 1 percent slopes	Very poorly drained	not used	9.6
Sandberg loamy sand, 2 to 12 percent slopes	Excessively drained	sandy	6.6
Sandberg loamy coarse sand, 6 to 30 percent slopes	Excessively drained	sandy	4.4
Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Poorly drained	sandy	1.6
Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	Excessively drained	sandy	1,320.7
Hubbard loamy sand, 0 to 2 percent slopes	Excessively drained	sandy	17.0
Hubbard loamy sand, 1 to 6 percent slopes	Excessively drained	sandy	175.4
Hubbard loamy sand, 2 to 12 percent slopes	Excessively drained	sandy	109.5
Solar Facility Subtotal			**1,680.0**
Collection Corridors			
Duelm loamy sand, 0 to 2 percent slopes	Moderately well drained	sandy	0.5
Isan sandy loam, depressional, 0 to 1 percent slopes	Very poorly drained	sandy	0.8
Rushlake coarse sand, 1 to 4 percent slopes	Moderately well drained	not used	0.9
Sandberg loamy sand, 2 to 12 percent slopes	Excessively drained	sandy	10.1
Sandberg loamy coarse sand, 6 to 30 percent slopes	Excessively drained	sandy	0.0
Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Poorly drained	sandy	0.3
Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	Excessively drained	sandy	60.2
Hubbard loamy sand, 0 to 2 percent slopes	Excessively drained	sandy	0.1
Hubbard loamy sand, 1 to 6 percent slopes	Excessively drained	sandy	6.5
Hubbard loamy sand, 2 to 12 percent slopes	Excessively drained	sandy	15.3
Collection Corridor Subtotal			**102.0**

* Farmland of Statewide Importance

[140] SPA, Appendix F: Agricultural Impact Mitigation Plan, Table 2

Potential Impacts

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

Construction of the solar facility will disturb approximately 1,303 acres within the land control area. 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.

The soils within the site are generally sandy in texture and excessively drained to well-drained. As a result, the soils are susceptible to wind erosion during dry periods and generally have a low susceptibility to compaction or rutting during wet conditions due to the sandy texture of the soil.

Soil cover and management at the solar facility will change from cultivated cropland to a mixture of and pervious areas with native groundcover plantings and approximately 38 acres of impervious surfaces.[141] Once permanent vegetation is properly established, stormwater management, as well as general soil health, might improve due to use of native plants. The location and amount of stored topsoil will be documented to facilitate re-spreading of topsoil after decommissioning. These benefits could extend beyond the life of the project if they are preserved through decommissioning practices, and if the site is returned to agricultural use.

Mitigation

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

- Section 4.3.9 requires protection and segregation of topsoil;
- Section 4.3.11 requires the permittee to obtain a MPCA CSW Permit and implement the BMPs within for erosion prevention and sediment control.
- Section 4.3.16 requires that “site restoration and management” practices enhance “soil water retention and reduces storm water runoff and erosion”.
- Section 4.3.17 requires the permittee to develop 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. Xcel Energy has included a draft AIMP as Appendix F of its site permit application.
- Section 4.3.18 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

[141] SPA, p. 29, table 2-3

and timing of revegetation will stabilize soils and improve overall soil health. Xcel Energy has included a draft VMP as Appendix G of its site permit application.

4.7.4 Surface Water and Floodplains

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

Solar farm and transmission line 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. Large electric power facilities the potential to adversely impact surface waters though construction activities which move, remove, or otherwise handle vegetative cover and soils. Changes in vegetative cover and soils can change runoff and water flow patterns.

The project is in the Upper Mississippi-Crow-Rum Watershed Basin.[142] There are no lakes, rivers, or other watercourses that cross the project site. Although three are several surface waterbodies in the project area. The nearest PWI river is the Mississippi River, located approximately 0.3 miles south at its nearest point (Unit 3). The surface waters within the project site are limited to the 3 PWI wetlands.[143]

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

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

There are 2.4 acres of FEMA designated Zone A floodplain within the land control area, 0.3 acres in Unit 1, and 2.1 acres in Unit 2.[144] The applicant states that the developed area of the project will not impact the FEMA floodplain areas. Due to Minnesota's warmer and wetter climate, there is increased risk for damaging rain events and more frequent flooding. These events could lead to destruction of PV panel materials. However, the applicant has stated that the panels have undergone TCLP (toxicity characteristic leaching procedure) testing to ensure the panels will not pose a danger to the environment. TCLP testing is the EPA-approved method for determining whether a hazardous

[142] Minnesota DNR, Minnesota's watershed basins. https://www.dnr.state.mn.us/watersheds/map.html
[143] SPA, p. 86
[144] FEMA, FEMA Flood Map Service Center. https://msc.fema.gov/portal/home

substance is likely to leach from solar panels into the ground and ground water. The test is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes.[145] The testing document provided by the applicant confirmed that in the occurrence of destruction to a PV panel, it is unlikely that hazardous materials will leach into nearby water resources during a flood or heavy rain event.[146]

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

There are no waters listed by the MPCA as impaired waters within the project site. There are impaired 3 rivers listed within one mile of the project, the Mississippi River, Clearwater River, and Elk River.[147] Mississippi River, located 0.3 miles south, is identified as impaired for aquatic consumption and aquatic recreation. Clearwater River, located approximately 0.5 miles southwest, is identified as impaired for aquatic consumption. Elk River, located 1.3 miles east, is listed as impaired for aquatic consumption, aquatic life, and aquatic recreation.

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 reaching nearby surface waters.

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

Mitigation

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

Best management practices to minimize the impact on surface waters will be utilized as a part of the SWPPP, including but not limited to sediment control, revegetation plans, and management of exposed soils to prevent sediment from entering waterbodies.[148]

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

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[145] EPA, SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure. https://www.epa.gov/hw-sw846/sw-846-test-method-1311-toxicity-characteristic-leaching-procedure

[146] **Appendix D**, Response to Question 2

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

[148] SPA, p. 88

- 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. Xcel Energy will also develop a Stormwater Pollution Prevention Plan (SWPPP) that complies with MPCA rules and guidelines. The SWPPP describes construction activity, temporary and permanent erosion and sediment controls, BMPs, permanent stormwater management that will be implemented during construction and through the life of the project. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction.
- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".

4.7.5 Wetlands

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

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.[149]

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 desktop reviews of available resource (i.e., National Wetlands Inventory (NWI) data, National Hydrography Dataset Mapping (NHD), the Minnesota Department of Natural Resources Public Waters Inventory, Federal Emergency Management Agency (FEMA) floodplain mapping, aerial photography, hydric soils maps, LiDAR, and digital elevation models); this was followed by a formal wetland delineation within the solar farm footprint. The NWI mapping identified 4 wetlands and 7 wetland complexes within the site, and 6 wetlands within the collection corridor. NDH mapping showed 9 waterbodies within the site, and 2 within the collection corridor, all corresponding to NWI mapped wetlands. PWI Basin mapping showed 3 PWI features mapped within Unit 2 (0.2 acres), Unit 9 (2.1 acres), and along the

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

collection corridor (3.0 acres). There are several PWI features mapped adjacent to the land control area, and no PWI mapped watercourses.[150]

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

Table 15. NWI-MN Wetlands[151]

Wetland Type	Acres										
	Solar Facility	Facility Units									Collection Corridors (Homerun)[152]*
		1	2	3	4	5	6	7	8	9	
Freshwater Emergent	22.63	1.52	5.5	--	--	--	3.50	0.81	--	10.0	1.27
Freshwater Pond	0.43	--	--	--	--	--	--	--	--	0.35	0.08
Total	23.06	1.52	5.5	--	--	--	3.50	0.81	--	10.35	1.35

The applicant commissioned wetland delineation for Phases 1 and 2 of the Sherco Solar Project in 2020 and for this Project in 2022 and 2023. In a wetland delineation performed in 2020 and 2023, 27 wetlands and 31 acres were delineated for the solar facility.[153] Seven of the wetlands are associated with MN Public Waters. The2020 wetland delineations for the Sherco Solar 1 and 2 Project included most of Units 1 and 2 and the collection corridor. A total of 19 wetlands were initially delineated encompassing 18.1 acres. The remaining portions of the site were delineated during the 2023 growing season. Westwood completed an onsite wetland delineation in November of 2022, and June of 2023 across 798.25 acres, identifying nine wetlands totaling 13.2 acres. Out of the wetlands delineated, 9.87 acres are within the land control area. Table 16. Delineated WetlandsTable 16 summarizes delineated wetlands within the land control area (covering both the 2000 and 2023 delineations).

[150] SPA, p. 85

[151] 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

[152] The Corridor Homerun is the only Collection Corridor that overlaps with wetland area. Other collection corridors were omitted due to no wetlands being present

[153] SPA, p. 86.

Additional wetlands outside of the land control area have been delineated for this project but were not included in the analysis.

Table 16. Delineated Wetlands

Wetland Type	Acres										
	Solar Facility	Facility Units									Collection Corridor (Homerun)*
		1	2	3	4	5	6	7	8	9	
Freshwater Emergent	9.79	1.16	5.44	--	--	--	--	--	--	0.82	1.27
Freshwater Pond	0.08	--	--	--	--	--	--	--	--	--	0.08
Total	9.87	1.16	5.44	--	--	--	--	--	--	0.82	1.35

*Delineated Wetlands includes wetlands that have been delineated within the land control area between 2020 and 2023. Homerun Collection Corridor is the only collection corridor that overlaps with wetland area. Other collection corridors were omitted due to no wetlands being present.

Potential Impacts

Although the NWI-MN identified approximately 23.06 acres Freshwater Emergent and Freshwater Pond wetland, the preliminary site layout for the solar facility avoids locating solar arrays and associated facilities in wetlands. There may be potential for temporary, short-term impacts to wetlands to occur during installation of the electrical collection lines and temporary access roads.

Mitigation

The project site layout has been designed to avoid all wetlands delineated to date, including those delineated during the 2023 growing season. If wetland impacts are required for the final layout, they will be permitted through the appropriate agency.

One unnamed PWI feature is mapped with the Collection Corridor Homerun, PWI Number 71013400, extending well into the corridor. Aerial photography and the 2020 Tetra Tech delineation review indicated that the area is located well above the Ordinary High-Water Mark (OHWM) of the PWI wetland. The applicant will work with the MNDNR Area Hydrologist to verify that the area where the mapped PWI wetland basin overlaps the corridor is outside of and above the ordinary high-water mark of that PWI wetland and verify that no DNR permit would be required for construction within this corridor.[154]

Section 4.3.13 of the DSP (**Appendix C**) generally prohibits placement of the solar energy generating system or associated facilities in public waters and public waters wetlands. The permit condition does allow for electric collector or feeder lines to cross or be placed in public waters or public waters

[154] SPA, at p. 88

wetlands subject to permits and approvals by the DNR and the USACE, and local units of government as implementers of the WCA.

4.7.6 Vegetation

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

The solar facility is located in the Anoka Sand Plan Subsection of the Eastern Broadleaf Forest Province. Prior to European settlement vegetation in the project area was primarily oak barrens and openings, with characteristic trees being bur oak and northern pin oak. Species associated with oak openings and barrens are found to be abundant, however large areas of these species are uncommon.[155] Current land-use in the project area is predominately agricultural. The land control area is dominated by cultivated crops established and maintained by humans.[156]

POTENTIAL IMPACTS

Construction of the solar facility will eliminate vegetative cover and create impermeable surfaces at access roads and inverter skids. Removal of vegetative cover exposes soils and could result in soil erosion. Temporary or permanent removal of vegetation also has the potential to affect wildlife habitat. Agricultural land within the solar facility would be converted to perennial, low growing vegetative cover, resulting in a net increase in vegetative cover for the life of the project. Native prairie seed mixes that include both native grasses and wildflowers will be used at the solar facility. Once established, vegetation would be maintained using best practice guidance from Minnesota's Board of Water and Soil Resources (BWSR) to meet the Habitat Friendly Solar standards.[157]

Some tree clearing is anticipated in the interior portions of the solar facility, with exact acreages to be determined by final engineering. The preliminary site design attempts to minimize tree clearing.

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

MITIGATION

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

- Section 4.3.17 requires the permittee to develop a vegetation management plan (VMP) in coordination with state agencies and to file the VMP prior to construction. The applicant has prepared a draft VMP as Appendix G 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.

[155] DNR. *Ecological Classification System: Ecological Land Classification Hierarchy*,(n.d.). https://www.dnr.state.mn.us/ecs/index.html
[156] SPA, at p. 89
[157] SPA, at p. 90

  - 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. Xcel Energy has included a draft AIMP as Appendix F of its application.
- Section 4.3.15 requires the permittee to minimize the number of trees removed and to leave existing low growing species in the ROW undisturbed to the extent possible, or to replant to blend in with adjacent areas following construction.

4.7.7 Wildlife and Habitat

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

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

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

Avian species common to the site include Red-tailed Hawk, Great-horned Owl, Bald Eagle, Canada Goose, Wild Turkey, American Crow, Mourning Dove, Eastern Kingbird, and Field Sparrow. The Project is located within the Mississippi Flyway, which is a major north-south migration route. Field investigations in April 2023 observed sandhill crane, eastern meadowlark, killdeer, blue-winged teal, mallard, common merganser, trumpeter swan, and snow goose. Many of the waterfowl were observed using fields within the site that were temporarily flooded from snowmelt as well as lakes and marshes adjacent to the area of land control. The site is located within the Prairie Hardwood Transition Bird Conservation Region. There are no Important Bird Areas (IBA) designated by the National Audubon Society within the site; the Lake Maria State Park – Henry Larson County Forest IBA is located south of the Mississippi River and Interstate 94, approximately 2.8 miles south of the site at the nearest point.[158]

4.7.7.1 Potential Impacts

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

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

The largest impact to wildlife associated with solar facilities is fencing. 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.[159] Predators can use fences to corner and kill prey species.[160]

Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact wildlife populations. Wildlife entanglement and death from plastic netting and other plastic materials has been documented in birds, fish, mammals, and reptiles.[161]

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

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

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[158] SPA, pp. 92-93

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

[160] 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.

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

Risks to birds have been identified near PV solar facilities. Preliminary findings in one report, based on limited data, suspect the danger is this appearance of water causing migrating birds to attempt to land, consequently incurring trauma and related predation.[162]

Habitat There are no DNR WMAs or migratory waterfowl feeding and resting, or USFWS Waterfowl Production areas within one mile of the site. The Clear Lake SNA is located approximately one-half mile northwest of Unit 3. There is Southern Dry-Mesic Oak (Maple) Woodland adjacent to and overlapping a portion of the southern border of Unit 5 that DNR characterizes as an MBS site of moderate biodiversity significance.

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 native grassland habitat for the life of the project. This change might be attractive to some species, and not others. Fencing will restrict ingress and egress of larger wildlife, and habitat benefits will be limited to small mammals, birds, insects, etc. accustomed to human disturbance. The VMP anticipates that mowing will only be done if deemed necessary, with a preference for mowing in the fall when plants are dormant, and the nesting season is over.[163] Overall, the project does not contribute to significant habitat loss or degradation or create new habitat edge effects.

4.7.7.2 MITIGATION

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

- Section 4.3.16 requires use of "site restoration and management practices that provide for native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators".
- Section 4.3.31 requires the permittee to coordinate with the DNR to ensure that the fence used in the project minimizes impacts to wildlife
- Section 8.12 requires permittees to report "any wildlife injuries and fatalities" to the Commission on a quarterly basis.
- Section 5.2 is a special condition that requires use of wildlife-friendly erosion control.

Other potential mitigation measures include:

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

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[162] 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

[163] SPA, Appendix G, VMP, p. 17

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 breeding season). Impacts can be mitigated.

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

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

The Division of Ecological and Water Resources within DNR manages the Natural Heritage Information System (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."[164] NHIS data includes federally endangered, threatened, or candidate plant species, and endangered or threatened animal species. The system also includes state endangered, threatened, or special concern species. The NHIS database a source of information, but not the sole source for identifying these resources, as some areas surveys have not been conducted extensively or recently making.

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

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

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

POTENTIAL IMPACTS

Natural Communities

Minnesota Biological Survey (MBS) systematically collects, interprets, and provides baseline data on the distribution and ecology of rare plants, rare animals and native plant communities.[165] The MBS uses four classifications denoting the level of biological diversity to rank sites:[166]

- **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 is Southern Dry-Mesic Oak (Maple) Woodland adjacent to and overlapping a portion of the southern border of Unit 5 that DNR characterizes as an MBS site of moderate biodiversity significance. The preliminary project layout places the fence line approximately 75 feet from the edge of the remaining woodland. There is an additional MBS site ranked as "moderate" located approximately 420 feet southwest of Unit 3.

Rare Species

Northern Long Eared Bat

The Northern Long Eared Bat (NLEB) is a federally listed species and state listed species of concern. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark or in cavities or crevices of both live and dead trees. The spread of white-nose syndrome across the eastern United States has become the major threat to the species. Activities that might impact this species include, but are not limited to, any disturbance to hibernacula and destruction or degradation of habitat including tree removal. While the land control area is primarily agricultural lands with little forested habitat, the nearby landscape includes riparian corridors, indicating a moderate probability of NLEB occurrence within the project area. The USFWS determined the Project is not likely to result in an unauthorized take of the NLEB and "may affect, but not likely to adversely affect" NLEB.[167] The preferred mitigation strategy to avoid

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[165] DNR. *Minnesota County Biological Surveys*, http://www.dnr.state.mn.us/eco/mcbs/index.html
[166] DNR, *Minnesota Biological Survey*, MBS Site Biodiversity Significance Ranks, https://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html.
[167] SPA, at p. 96

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.

Tri-colored bat (Perimyotis subflavus)

The tri-colored bat, also known as the easter pipistrelle, is proposed for listing under the Endangered Species Act and is a state-listed species of concern. The USFWS proposed listing the species as endangered in September 2022. The species has been found regularly, though in low numbers, in caves and mines int the southeastern part of the state.[168] The species may roost in trees within the site during their active season (April – September).

Monarch Butterfly (Danaus plexippus)

The monarch butterfly is a federal candidate species. The species is common throughout Minnesota during summer months and is most frequently found in habitats where milkweed and native plants are common, including roadside ditches, open areas, wet areas, and urban gardens.[169]

Whooping Crane (Grus americana)

Whooping cranes are a federally listed endangered species. The species is not known to nest in Minnesota and sightings are transient and rare; the nearest confirmed sighting of the species was at the Sherburne National Wildlife Refuge approximately 10 miles from the area of site control. The UFWS lists Minnesota as supporting known occurrences of a "Non-essential Experimental Populations" of the species and consultation is not necessary for individual that occur outside a National Wildlife Refuge or a National Park.

Bald Eagles and Golden Eagles

In Minnesota, the bald eagle nesting season is generally January through early July. Bald eagles are primarily found near rivers, lakes, and other waterbodies in remote and, more recently, within metropolitan areas.[170].

Bald eagles are afforded additional protections under the Bald and Golden Eagle Protection Act, which is administered by the USFWS. Wind energy facilities are eligible to apply for Incidental Take Permits and Nest Removal Permits issued by the USFWS, which will allow for the non-intentional take of bald eagles and the removal of bald eagle nests, respectively. 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.

Ground-based raptor nest surveys conducted in 2023 identified one nest in the land control area and with an adult eagle feeding chicks and an alternate nest approximately 100 feet away. Although no other nests were observed in the forested area south of the land control area, although the Mississippi River is a likely habitat for nests to occur. The USFWS will coordinate appropriate mitigation measures

[168] DNR, Rare Species Guide, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC03020
[169] DNR, Monarch Butterfly https://www.dnr.state.mn.us/insects/monarchbutterfly.html
[170] DNR, *Bald Eagles in Summer*. https://www.dnr.state.mn.us/birds/eagles/summer.html

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. Should Xcel Energy seek to remove the nests, it will need landowner approval before submitting the permit. And nests will only be removed after the bald eagles have fledged and nests are determined to be inactive

Loggerhead Shrike (Lanius ludovicianus)

The Loggerhead shrike is a state-listed endangered species. Loggerhead shrike prefer large open prairie areas for hunting, and shrub thickets for nesting habitat. The loggerhead shrike's State threatened status was changed to endangered in 2013 by the DNR, this status change occurred after survey results showed a significant decline in the number of shrikes being observed in the State. Large, open native prairie habitat in the State of Minnesota has declined significantly due to conversion to agricultural cropland. The species has been documented in the vicinity of the site. The preferred mitigation to avoid impacts to the Loggerhead Shrike is to avoid tree and shrub removal within suitable habitat during the April through July breeding season. If tree or shrub removal cannot be avoided during the breeding season, a qualified surveyor should inspect the trees/shrubs for active nests prior to removal. [171]

Butternut (Juglans cinerea)

Butternut is a state-listed endangered species. The native hardwood occurs in mesic hardwood forests in eastern Minnesota There is a low potential for the species to occur within the site due to lack of suitable habitat, but there is potential habitat in forested areas outside the site. The project will not directly impact the butternut.

Blanding's Turtle Emydoidea blandingii)

Blanding's turtle (is listed as a Minnesota threatened species. The turtle needs both wetland and upland habitat to complete its life cycle. The species has been documented in the vicinity of the Project. The Project has the potential to impact this rare turtle through direct fatalities and habitat disturbance/destruction due to excavation, fill, and other construction activities. DNR has provided guidance on preventative measures to minimize impacts to Blanding's Turtles. DNR requires implementing a number of preventative measures:

- Avoid wetland and aquatic impacts during hibernation (October 15 to April 15), if the area is suitable for hibernation,

- Erosion control blankets should be limited to bio-netting (no plastic, including hydro-mulch),
- Construction areas, especially aquatic or wetland areas, should be thoroughly checked for Blanding's turtles before the use of heavy equipment or any ground disturbance.

o Providing the Blanding's turtle flyer to all contractors working in the area.

o Monitoring for turtles during construction activities and report any sightings to the DNR Nongame Specialist.

[171] DNR Comment letter (eDocket ID: 202311-200627-01)

- If turtles are in imminent danger, they must be moved by hand out of harm's way, otherwise, they are to be left undisturbed. DNR recommends that erosion control methods avoid use of plastic components [172]

Checking open trenches and removing trapped turtles before filling trenches can also minimize impacts to turtles.

Black Sandshell (Ligumia recta)

The black sandshell is freshwater mussel that inhabits medium and large rivers with sand and gravel substates. The species is a state-listed species of special concern.[173] As there is no riparian habitat withing the area of site control, the project will not impact the black sandshell.

Red-shouldered Hawk (Buteo lineatus)

The red-shouldered hawk is a state listed species of special concern. The hawk is a medium sized raptor with relatively long wings. The species is most commonly found in large tracts of mature deciduous forest with scattered wetland openings.[174]

Seaside Three-awn (Aristida tubrculosa)

Seaside three-awn is a state-listed threatened species. The small tufted grass approximately 12 inches in height. The species is a wind-pollinated annual which needs open and sparsely vegetated habitats with dry and shifting sand. In Minnesota, the species occurs exclusively in dray and loose and in sand savannas, sand prairies, and dues where vegetation is sparse. There is no suitable habitat within the land control area.

Hill's Thistle (Cirsium pumilum var. hillii)

Hill's thistle is a state-listed species of special concern. The species native Midwestern thistle that has seen a decline as a result of losses to the prairie and sandy woodland habitat. The areas marked as hay/pasture with small trees and shrubs may provide suitable habitat for Hill's thistle. However, a field visit in May 2023 found these areas to be dominated by smooth brome and other non-native, invasive species, making the presence of Hill's thistle possible, but unlikely.

MITIGATION

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

The DSP (**Appendix C**) proposes special conditions related to the NLEB, Blanding's Turtle, and the Loggerhead Shrike, and Bald Eagle.

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[172] DNR Comment, December 27, 2023, eDocket No. 202312-201580-01
[173] DNR, Rare Species Guide, Ligumia recta, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV26020
[174] DNR, Rare Species Guide, Buteo lineatus, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABNKC19030

- Section 5.4 requires the permittee to comply with the USFWS guidance and requirements in effect regarding NLEB, including tree clearing restrictions if applicable.
- Section 5.5 requires the permittee to implement DNR recommendations to avoid and mitigate potential impacts to the Blanding's Turtle during construction.
- Section 5.6 requires the permittee to avoid tree and shrub removal within suitable Loggerhead Shrike habitat during the April through July breeding season, and to coordinate with DNR if tree and shrub clearing will occur during the breeding season.to identify potentially suitable habitat and ensure that a qualified surveyor inspects the trees/shrubs for active nests prior to removal.
- Section 5.7 requires the permittee to file documentation authorizing any Bald Eagle nest removal prior to construction.

4.7.9 Climate Change

The project will help to shift energy production in Minnesota and the upper Midwest toward carbon-free sources. Construction emissions will have a short- term negligible increase in greenhouse gases that contribute to climate change. The project's design incorporates design elements that minimize impacts from the increase in extreme weather events such as increase flooding, storms, and heat wave events that are expected to accompany a warming climate.

Climate change refers to any significant change in measures of climate lasting for an extended period. Greenhouse gases (GHG) are gaseous emissions that trap heat in the atmosphere and contribute to climate change. These emissions occur from natural processes and human activities. The most common GHGs emitted from human activities include carbon dioxide, methane, and nitrous oxide.

POTENTIAL IMPACTS

Construction activities will result in short-term increases in GHG emissions from the combustion of fossil fuels in construction equipment and vehicles.

Total GHG emissions for project construction are estimated to be approximately 12,310 tons of carbon dioxide (CO_2).[175] The project's construction emissions are an insignificant amount relative to Minnesota's overall emissions of approximately 137 million tons in 2020.[176]. 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 21 tons of CO_2 annually.[177]

If electrical energy from the project displaces energy that would otherwise be generated by carbon-fueled power plants (e.g., coal, natural gas), the project could reduce GHG. Thus, compared to non-renewable energy generation, the project would be beneficial with respect to GHG emissions.

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[175] **Appendix D**, response to Question1.
[176] MPCA, *Greenhouse gas emissions data.* https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory
[177] **Appendix E**, response to Question 1

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, e.g., storms and high winds could damage solar panels. More extreme storms also mean more frequent heavy rainfall events. 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. These climate trends are not expected to have a significant impact on the project because the site is being designed based on local hydrology and topography. The nature of the site, with sandy soils that infiltrate stormwater effectively, will mitigate the impacts that extreme rain events might have. Rainfall infiltration is calculated to increase once the project is completed, when native prairie vegetation will replace seasonal row crops across most of the site.

The FEMA National Risk Index[178] rates Sherburne County as having "relatively moderate" risk for hail. The solar panel modules selected for the Project are designed to withstand wind and hail events and have undergone hail impact testing showing they can withstand impacts from hailstones greater than an inch in diameter. The tracking systems are also designed to automatically stow the panels in the safest position based on the weather conditions (wind, hail, flooding, deep snow, etc.). For example, panels are stowed in a nearly vertical position during hail events by re-orienting the trackers, which limits direct impacts between hailstones and the panels.

MITIGATION

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

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

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

Xcel Energy reports that it used a risk assessment tool to screen the site for the probability of extreme weather and impacts from extreme storms such as stormwater runoff, strong winds and hail. The results from the screening informed the selection of the site, design and engineering of the facility, and equipment selection. Xcel Energy has incorporated the following considerations into the project's design in order to minimize exposure to a warmer, wetter, and more energetic climate.

Xcel Energy states that it will incorporate local hydrology into the site design. A stormwater report, including hydraulic and hydraulic analysis was completed for the site and used to inform site design and grading. Site grading has been designed to enhance infiltration of stormwater across the site.

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

Inverters will be installed on concrete pads off the ground and no facilities are placed within areas of flood risk.

PV panels are typically rated to withstand the National Weather Service's definition of severe hail (hailstones up to one inch in diameter and 50 mph winds), with some manufacturers providing even higher hail ratings. The solar panel modules selected for the Project are designed to withstand wind and hail events and have undergone hail impact testing showing they can withstand impacts from hailstones greater than an inch in diameter. The tracking systems are also designed to automatically stow the panels in the safest position based on the weather conditions (wind, hail, flooding, deep snow, etc.). By re-orienting the trackers, panels can be stowed in a nearly vertical position, further limiting direct impacts from hail. Tempered glass used in the panel construction also limits the potential for cracked glass to escape the panel enclosures if they do become broken. The panels have also undergone TCLP (toxicity characteristic leaching procedure) testing to ensure the panels will not pose a danger to the environment. TCLP testing is the EPA-approved method for determining whether a hazardous substance is likely to leach from solar panels into the ground and ground water.

4.8 Unavoidable Impacts

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

Potential impacts and the possible ways to mitigate against them were 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.

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

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

4.9 Irretrievable or Irreversible Impacts

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

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

4.10 Resource Topics Receiving Abbreviated Analysis

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

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

4.10.1 Displacement

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

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

4.10.2 Communications

Electronic interference from the proposed project is not anticipated. The project area is served by about 70 AM and FM radio stations and more than 100 digital television channels. There are no radio, microwave, or television towers are located within the boundary of the solar facility. The nearest cell tower is in Clear Lake, approximately 0.1 mile2 miles northeast of Unit 1 and 0.1 miles northwest of Unit 2. Cellular phone service in the service area is provided by national carriers Global Positioning System (GPS) equipment relies on satellites and mobile receiving equipment.

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

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

4.10.3 Implantable Medical Devices

Electromagnetic fields (EMF) might interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Impacts to implantable medical devices and persons using these devices are not expected to occur, but, if they did occur, moving away from the project would return the pacemaker to normal operation. Section 4.3.29 of the DSP requires the permittee to provide educational materials about the project to adjacent landowners. Additional mitigation is not proposed.

4.10.4 Forestry

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

4.10.5 Mining

There are no gravel pits within the area of land control. Most gravel operations in the project vicinity are north of U.S. Highway 10, the nearest gravel pit is approximately one mile east of Unit 9.[179] Through sale of lease of the land used for the solar facility, the current landowners choose energy production as the higher and greater economic use.

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

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

4.11 Cumulative Potential Effects

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

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

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

[179] SPA, p. 71

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

4.11.1 Analysis Background

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

Cumulative potential effects are impacts to the environment that results from "the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects."[180]

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

Commerce staff contacted local governments, MnDOT, the Environmental Quality Board's interactive project database, and Xcel Energy to identify foreseeable projects. Reasonably foreseeable projects are identified in Table 17. EERA staff has included several potential data centers in the area, as they were identified in Xcel Energy's response, and have been covered in media reports. EERA staff notes that although improvements to U.S. Highway 10 between St. Cloud and Clear Lake and the intersection of US. Highway 10 and Highway 25 near Becker are being studied, no specific projects are yet proposed or funded, and not included in the table.

In its application Xcel Energy notes that the Sherco Generating Plant will cease operations by 2030. The existing interconnection infrastructure and agricultural land nearby is likely to create an opportunity for additional solar development in the area over the next decade.[181] Although increase solar development is likely, only one future project identified by Xcel Energy is included in beyond those projects identified in Table 17, there are no specific solar projects identified.

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

[180] Minn. R. 4410.0200, subp. 11a
[181] SPA, pp. 17 - 18

Table 17. Current and Reasonably Foreseeable Future Projects

Project	Location	Anticipated Timeframe	Description
Decommissioning of Sherco Generating Station	Becker	2023 - 2030	The 3 units of the 2,400 MW coal fired Sherco Generating Facility will be retired in phases between December 2023 and 2030
Sherco Solar Units 1 and 2	Becker, Clear Lake	2024 - 2025	460 MW solar generating facility in Becker
Unnamed Xcel Energy Solar Project and Associated Transmission Line	Sherburne County	2025 - 2027	800 acre solar facility located approximately 1.75 miles north of the Sherco Solar 3 facility. Would also include a transmission line.
Xcel Energy Long Duration Energy Storage Project - Becker	Becker	2024 - 2025	10 MW energy storage battery project on the existing Sherco plant site in Becker.
Xcel Energy Sherco West Battery Energy Storage (BESS)	Clear Lake Township	2025 - 2028	58 MW BESS on a 20-acre site adjacent to the Sherco Generating Plan in Clear Lake Township.
Xcel Energy Battery Storage	Becker	2024 - 2025	10 MW/1,000 MWh iron-air battery storage system as a pilot project on 5 acres at Sherco Plant
Microsoft Data Center	Becker	TBD	Microsoft recently purchased 295 acres from Xcel Energy to develop a data center.
Elk River Technologies Data Center	Becker	TBD	Elk River Technologies has an option to develop a data center on 348 acres in Becker for a data center.
Potential Xcel Data Center	Becker	TBD	Xcel Energy is marketing a site to the west of the Sherco plant for a potential data center.
Highway 24 Bridge	Clearwater	2026	Reconstruction of Highway 24 bridge over Interstate 94 in Clearwater
Alexandria – Big Oaks 345 kV Transmission Line	Wright and Sherburne Counties	2025 - 2027	Project would add a second circuit to existing poles. Most of the project would be south of the Mississippi River, and would cross the river southeast of the Sherco Solar 3 Project to connect at the Sherburne County Substation
Minnesota Energy Connection Project	Sherburne County	2025 - 2031	New double-circuit 345 kV transmission line between the Sherburne County Substation and Lyon County. Several routes are under consideration. One route follows River Road SE (Sherburne CR 8) near units 3, 4, 5, and 6.

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

4.11.2 Human Settlement

Cumulative potential effects on human settlements are anticipated to be moderate. Some projects would have positive effects on human settlements by improving transportation and safety. Future energy and data center projects will result in aesthetic impacts. The anticipated transportation projects are largely improvements in existing roadways, so aesthetic impacts are anticipated to be minimal. Collectively, the growth of solar energy generation, both utility-scale and community solar, will change the aesthetics of the area by converting agricultural land to power production. The Sherco Solar 3 Project will result in aesthetic impacts (Section 4.3.1). New solar facilities, data centers, and transmission lines introduce new visual elements into the landscape, while the decommissioning of the Sherco Generating Plant will remove a large visual element in the existing landscape.

Decommissioning of the Sherco Generating Plant, and construction of the Sherco Solar 3 Project and the other identified projects will generate construction related jobs and material sales. These jobs and materials may or may not be sourced locally. Impacts are anticipated to be positive, but short-term. The closure of the Sherco Generating Plant will result in the loss of approximately 300 fulltime positions. While none of the identified projects are anticipated to create significant numbers of long-term jobs individually, the cumulative impact will somewhat counter the job losses from the Sherco Generating Plant. The increase in renewable energy projects in the area may increase tension in the project area between renewable energy and rural character.

4.11.3 Public Health and Safety

Cumulative potential effects on public health and safety are anticipated to be minimal to slightly positive. Impacts on public health and safety as a result of the Sherco Solar 3 Project are anticipated to be minimal (Section 4.4.2). Most of the projects foreseen in the project area are energy-related and are also expected to have minimal impacts on public safety when operational. Road and highway related projects are being undertaken to maintain and improve local roads to ensure their safe operation and the public's health and safety

4.11.4 Land-based Economies

Cumulative potential effects on land-based economies are anticipated to be moderate. The project area continues to see a decline in agricultural lands due to population growth in the area as well as additional electric power generation, particularly solar generation, and data centers. Additional energy infrastructure will result in conversion of agricultural land from production to power generation.

4.11.5 Archaeological and Historical Resources

Because archaeological resources are unidentified, cumulative potential effects are unknown. As noted in Section 4.6, there are many burial mounds in Sherburne County. With proper mitigation measures, impacts to these resources can be minimized.

4.11.6 Natural Resources

Cumulative potential effects on the natural environment are anticipated to be minimal to moderate. Most of the foreseeable projects are in cultivated agricultural areas or along roadways resulting in minimal loss of high-quality habitat. Impacts are limited along roadways by the use of existing infrastructure ROW. Wildlife might be inadvertently harmed or killed during construction. Long term and permanent impacts include a greater risk of bird electrocution or collision due to increased

transmission lines on the landscape. Potential impacts can be mitigated. The overall impact intensity level is expected to remain minimal.

4.11.7 Rare and Unique Resources

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

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