Environmental Assessment:

Birch Coulee Solar Project

The Human and Environmental Impacts of Constructing and Operating the

125 MW Birch Coulee Solar Project

February 2025

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Birch Coulee Solar, LLC (Birch Coulee Solar), an affiliate of AES Clean Energy (AES), proposes to construct, own, and operate a 125 megawatt solar energy generating system and associated facilities in Renville County, Minnesota. Birch Coulee Solar must obtain a site permit from the Minnesota Public Utilities Commission before it can construct the proposed Birch Coulee Solar Project.

Sources

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

Project Mailing List

To place your name on the project mailing list contact docketing.puc@state.mn.us or (651) 201-2246 and provide the docket number (23-477), 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
AADT	annual average daily traffic counts
AC	alternating current
AIMP	Agricultural Impact Mitigation Plan
ALJ	administrative law judge
ANSI	American National Standards Institute
applicant	Birch Coulee Solar
application	site permit application
AQI	Air Quality Index
BMP	best management practice
BWSR	Board of Water and Soil Resources
CMMS	computerized maintenance management system
CO	carbon monoxide
Commerce	Department of Commerce
Commission	Public Utilities Commission
CR 73	County Road 73
CSAH 5	County State Aid Highway 5
CSW PERMIT	Construction Stormwater Permit
CWA	Clean Water Act
dBA	A-weighted sound level recorded in units of decibels
DC	direct current
DEED	Department of Employment and Economic Development
DNR	Department of Natural Resources
DSP	draft site permit
DWSMA	Drinking Water Supply Management Area
EA	environmental assessment
EERA	Energy Environmental Review and Analysis Unit
EJ	environmental justice
EMF	electromagnetic fields
EPA	United States Environmental Protection Agency
EPC	engineering, procurement, and construction
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
HVTL	high voltage transmission line
IEEE	Institute of Electrical and Electronics Engineers
IRA	Inflation Reduction Act
kV	Kilovolt
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
mG	milligauss
MIAC	Minnesota Indian Affairs Council
MISO	Midcontinent Independent System Operator

MNDLI	Minnesota Department of Labor and Industry
MnDOT	Minnesota Department of Transportation
MNEC	Minnesota Energy Connection
MPCA	Minnesota Pollution Control Agency
MW	megawatt
MWh	megawatt hour
MWI	Minnesota Well Index
NAC	noise area classification
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHIS	Natural Heritage Information System
NLEB	Northern Long Eared Bat
NO_2	nitrogen dioxide
NOX	nitrogen oxides
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
O&M	operations and maintenance
OAH	Office of Administrative Hearings
OSA	Office of the State Archeologist
OSHA	Occupational Safety and Health Administration
PBC	Prairie Bush Clover
PCO	point of change of ownership
PM	particulate matter
POI	point of interconnection
Project	Birch Coulee Solar Project
PV	photovoltaic
PWI	Public Waters Inventory
ROI	region of influence
ROW	right-of-way
SCADA	supervisory control and data acquisition
SDS	State Disposal System
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SO_2	sulfur dioxide
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWCD	Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
TCB	Tricolored Bat
TCLP	Toxicity Characteristic Leaching Procedure
TCS	Traditional Cultural Specialist
TH 19	Minnesota State Highway 19

THPO	Tribal Historic Preservation Officer
transmission owner	Xcel Energy
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VMP	Vegetation Management Plan
WCA	Wetland Conservation Act
WHP	Wellhead Protection Program
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 1,041.6-acre area for which Birch Coulee Solar is assumed to have site control through ownership, a lease agreement, or an easement. The site permit application refers to this as the "Site." For this document, it applies to the area for the solar facility as well as area for collection corridors, substation and transmission lines. The term is used to bound a review area and should not be understood to imply the applicant has secured, or will definitely secure, the necessary land rights.

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

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

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

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

preliminary development area means the 768.2-acre area within the land control area where Birch Coulee Solar proposes to build the solar facilities. This area does not include the collection corridors or required setbacks. This area is also referred to as the project boundary. The site permit application refers to this as the "Anticipated Development 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.

utility-owned means owned by Xcel Energy

1 Introduction

Birch Coulee Solar, LLC (Birch Coulee Solar, applicant) is proposing to construct and operate the Birch Coulee Solar Project (project), a 125 megawatt (MW) solar farm in Renville County, Minnesota. Birch Coulee Solar must obtain a site permit from the Minnesota Public Utilities Commission (Commission) before it can construct and operate the project. The project will connect to the electric transmission grid through the existing Xcel Energy Franklin 115 kV substation or a point of change of ownership (PCO) with the transmission owner (Xcel Energy) immediately adjacent to the project. A short (<500 ft) aboveground 115 kV transmission line will connect the project substation to a utility-owned switchyard, which will connect to the Franklin substation via a utility-owned ring-bus point of interconnection (POI). If a utility-owned switchyard is not needed, the project substation will connect directly with the transmission owner through a PCO, located inside or adjacent to the Franklin substation, via a short (<500 ft) aboveground 115 kV transmission line.

The applicant filed a site permit application (application) on July 29, 2024, and the Commission found the application to be substantially complete on September 10, 2024.

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

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

1.1 How is this document organized?

The EA addresses the matters identified in the scoping decision.

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

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

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

- **Chapter 4** describes the environmental setting; details potential human and environmental impacts from the Birch Coulee Solar Project; and identifies measures to mitigate adverse impacts. It summarizes the cumulative potential effects of the project and other projects and lists unavoidable impacts and irreversible and irretrievable commitments of resources.
- **Chapter 5** identifies the sources used to prepare the document.

1.2 What does the applicant propose to construct?

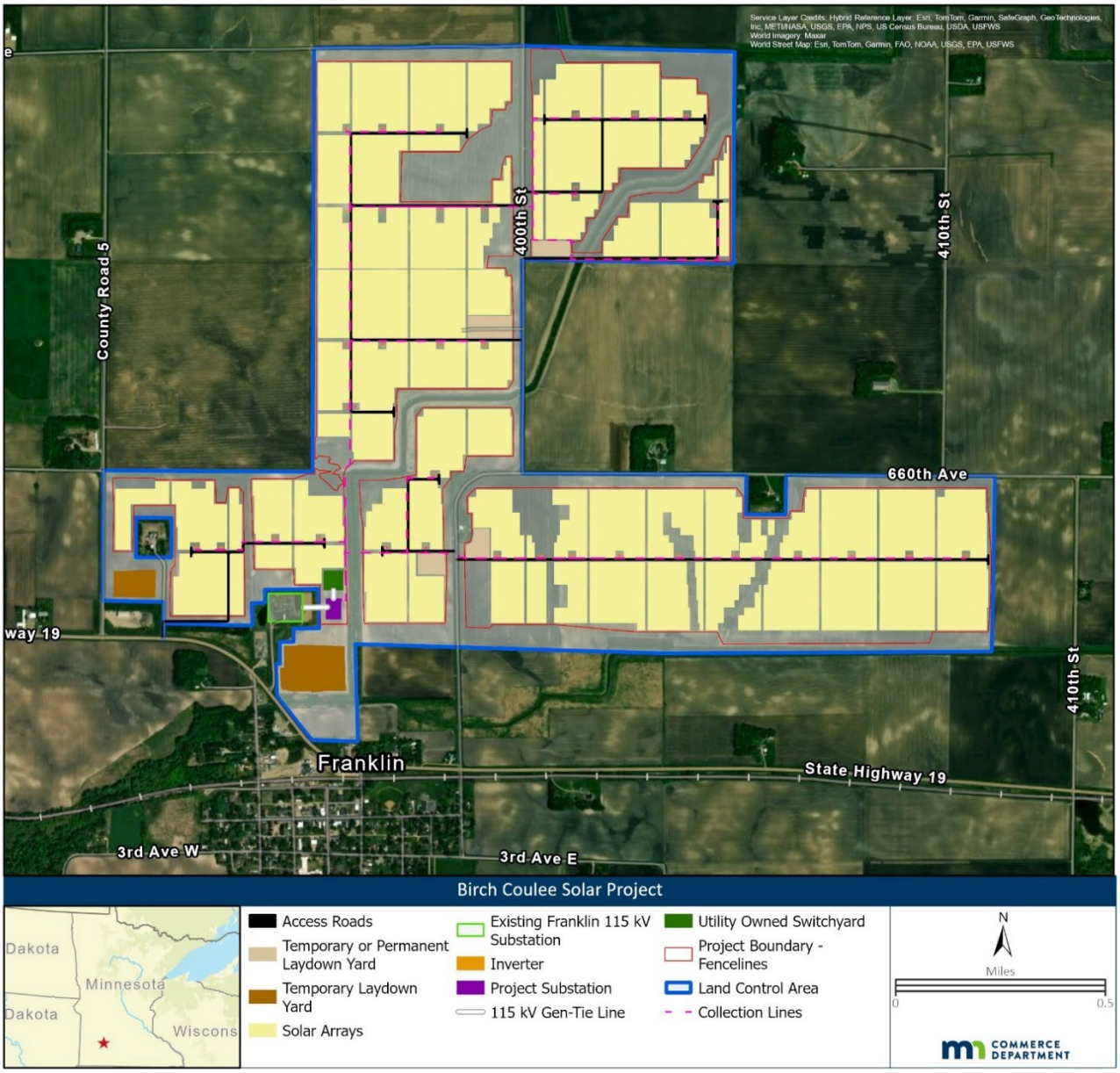
Birch Coulee Solar proposes to construct a 125 megawatt solar energy generating system and associated facilities on a site of approximately 1,041.6 acres in Birch Cooley, Camp, and Bandon Townships and the city of Franklin in Renville County, Minnesota.

The project will consist of photovoltaic (PV) panels, trackers, inverters, transformers, approximately 6.4 miles of gravel access roads, security fencing, above-ground and below-ground electric collection lines, a project substation, and associated facilities (Figure 1). Birch Coulee Solar proposes to locate the solar facilities in blocks within the 1,041.6 acres of land under lease or owned by the applicant. Based on preliminary design, Birch Coulee Solar anticipates approximately 768.2 acres within the 1,041.6 acre land control area will be developed for the solar facilities. The solar facilities will be connected to the project substation via 34.5 kilovolt (kV) underground electric collection lines. The collection corridor is estimated to comprise approximately 8.5 acres of the preliminary development area. A short (<500 ft) aboveground 115 kV transmission line will either connect the project substation directly to the PCO with the transmission owner, or to the Franklin substation through a utility-owned switchyard. The need for a utility-owned switchyard will be determined prior to construction.

Construction is anticipated to begin in 2028 with completion and operation anticipated in 2030.[2]

[2] Birch Coulee Scoping Comments, October 25th, 2024, eDockets number 202410-211314-01.

Figure 1. Proposed Birch Coulee 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 Renville County or a Construction Stormwater Permit from the Minnesota Pollution Control Agency (MPCA). A site permit supersedes local zoning, building, and land use rules.[3] The Commission's site permit decision must be guided, in part, however, by consideration of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts."[4]

Birch Coulee Solar applied to the Commission for a site permit for the project on July 29, 2024.[5] The Commission must consider whether the record supports issuing a site permit, and what conditions should be placed on the site permit.[6]

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

1.4 What is the public's role?

Minnesota needs your help to make informed decisions.

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

1.5 What is an Environmental Assessment?

[3] Minnesota Statute 216E.10, subd. 1.
[4] Minnesota Statute 216E.03, subd. 7.
[5] Birch Coulee Solar Project, Application to the Minnesota Public Utilities Commission for a Site Permit for a Large Electric Generating Facility, July 29th, 2024, eDockets Numbers 20247-209066-01 (through -09), 20247-209069-01 (through -08).
[6] If the Commission grants a site or route permit, it chooses which of the studied locations is most appropriate. In this matter only one site location is studied.
[7] *See generally* Minnesota Statute 216E.

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

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

1.6 Where do I get more information?

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

If you would like more information or if you have questions, please contact Commerce staff: Lauren Agnew (lauren.agnew@state.mn.us), (651) 539-1838 or the Commission Staff: Craig Janezich (craig.janezich@state.mn.us) (651) 201-2203.

Information about the project, including the site permit application, notices, and public comments, can be found on eDockets: https://efiling.web.commerce.state.mn.us/documents by searching Docket #s "23-477". Information is also available on Commerce's webpage for the project: https://apps.commerce.state.mn.us/web/project/15658.

1.7 What permits are needed?

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

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

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

1.8 What are the potential impacts of the project?

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

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

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

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

1.8.1 Human Settlement

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

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

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

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

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

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

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

Tourism and Recreation The impact intensity level to tourism and recreation resources is anticipated to be 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.

1.8.2 Human Health and Safety

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

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

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

1.8.3 Land-based Economies

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

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

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

1.8.4 Archeological and Historic Resources

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

1.8.5 Natural Resources

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

Air Quality Potential impacts to air quality during construction would be intermittent, localized, short-term, and minimal. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated.

Once operational, the solar array will not generate criteria pollutants or carbon dioxide. Negligible fugitive dust and exhaust emissions would occur as part of routine maintenance activities. Impacts are unavoidable and do not affect a unique resource. Impacts can be minimized.

Geology and Groundwater Impacts to geology are not expected. Potential impacts to groundwater resources, should they occur, would be intermittent and moderate, but have the potential to occur over the long-term. Impacts can be mitigated through use of Best Management Practices (BMPs) for stormwater management and incorporating recommendations on project design and construction in areas of

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

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

Wetlands The impact intensity level is anticipated to be minimal. There is a potential for wetlands to be indirectly affected, with minor direct impacts if engineering constraints require fencing to cross wetlands. These impacts will be short- or long-term, of a small size, and localized. Impact can be mitigated.

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

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

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

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

1.9 What factors guide the Commission's decision?

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

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

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

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

B. Effects on public health and safety.

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

D. Effects on archaeological and historic resources.

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

F. Effects on rare and unique natural resources.

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

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

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

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

K. Electrical system reliability.

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

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

N. Irreversible and irretrievable commitments of resources.

The Commission is also guided by the "state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric

energy security through efficient, cost-effective power supply and electric transmission infrastructure."[8]

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

1.10 Solar Facility Siting Factors – Analysis and Discussion

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

Factor M (unavoidable impacts) and **Factor N** (irreversible and irretrievable resource commitments) are discussed in Section 4.9 and Section 4.10, respectively, of this EA. **Factor G** (application of design options) and **Factor L** (costs dependent on design) do not apply as the design of the proposed project is the only design under consideration.

Other factors are ranked as follows:

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

Table 1. Application of Siting Factors – Solar Facility

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

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

Property Values	○	○
Recreation	●	●
Socioeconomics	●	●
Factor A: Public Services		
Element	**Construction**	**Operation**
Airports	●	●
Roads	○	●
Utilities	●	●
Factor B: Public Safety		
Element	**Construction**	**Operation**
EMF	●	●
Emergency Services	●	●
Medical Devices	●	●
Public Safety	○	●
Stray Voltage	●	●
Worker Safety	●	●
Factor C: Land-based Economies		
Element	**Construction**	**Operation**
Agriculture	○	○
Forestry	●	●
Mining	●	●
Tourism	●	●
Factor D: Archaeological and Historic Resources		
Element	**Construction**	**Operation**
Archeological	●	●
Historic	●	●
Factor E: Natural Resources		
Element	**Construction**	**Operation**
Air Quality	●	●
Climate Change	●	●
Geology and Groundwater	○	●
Soils	●	●
Surface Water	○	●
Topography	●	●
Vegetation	●	●
Wetlands	●	●

Wildlife	○	●
Wildlife Habitat	●	●
Factor F: Rare and Unique Resources		
Element	**Construction**	**Operation**
Fauna	●	●
Flora	●	●
Factor I: Use of Existing Generating Plants		
Element	**Construction**	**Operation**
Existing Plants	⊘	⊘

1.10.1 Discussion

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

FACTOR A: HUMAN SETTLEMENT

Aesthetics Visual impacts are subjective. Thus, potential impacts are unique to the individual and can vary widely. Because there are existing energy and infrastructure facilities nearby (Figure 15), 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 B: PUBLIC SAFETY

Public Safety Potential impacts to motorist safety associated with construction are anticipated to be short-term and localized. The impact intensity is expected to be moderate to significant. Impacts can be mitigated by alteration of project entry points or installation of permanent road features to reduce collision risk. During operation, no impacts to motorist safety are anticipated; negligible traffic increases would occur for maintenance.

FACTOR C: LAND-BASED ECONOMICS

Agriculture Potential impacts to agricultural producers are anticipated to be minimal—lost farming revenues will be offset by easement agreements. A negligible loss of farmland in Renville County would occur for the life of the project. Nearly all of the solar facility is located on land classified as prime farmland or prime farmland if drained. The project will impact approximately 940 acres of prime farmland. The applicant indicates that no feasible or prudent alternatives to the project exist. Potential impacts are localized and unavoidable but can be minimized.

FACTOR E: NATURAL RESOURCES

Geology and Groundwater Impacts to geology are not expected. Localized impacts to groundwater resources, should they occur, would be intermittent, but have the potential to occur over the long-term. Indirect impacts from surface waters might occur during construction. Impacts can be mitigated through use of BMPs for stormwater management and incorporating recommendations from the appropriate agencies on project design and construction in areas of drinking water sources.

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.

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

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

FACTOR I: POWER PLANTS

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

1.11 What's next?

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

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

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

2 Proposed Project

Birch Coulee Solar proposes to construct and operate an up to 125 MW solar farm in Birch Cooley, Camp, and Bandon Townships and the city of Franklin in Renville County, Minnesota. The developed portion of the project will occupy approximately 768 acres of the 1,041 acres under lease or purchase agreements. The project will connect to the electric transmission grid through the existing Xcel Energy Franklin substation immediately adjacent to the project. A short (<500 ft) aboveground 115 kV transmission line will connect the project substation to the PCO with the transmission owner or, if determined necessary, to the Franklin substation through a utility-owned switchyard. This chapter describes the project and how it would be constructed, operated, and decommissioned.

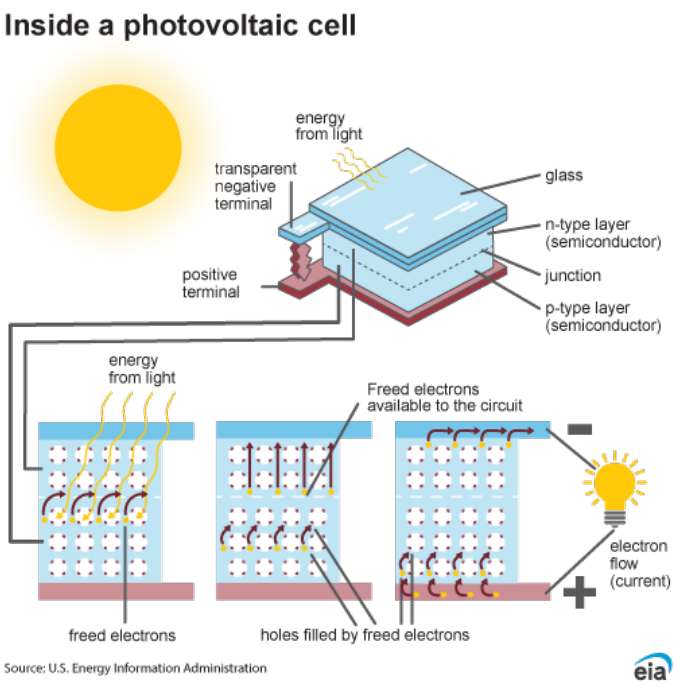
2.1 Solar Facility

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 photovoltaic (PV) cell, some radiation is absorbed, which excites electrons within the cell. This results in a continuous flow of electrons from the front to the back of the panel through electrical connections, which results in a continuous flow of electric current as depicted in Figure 2.[9]

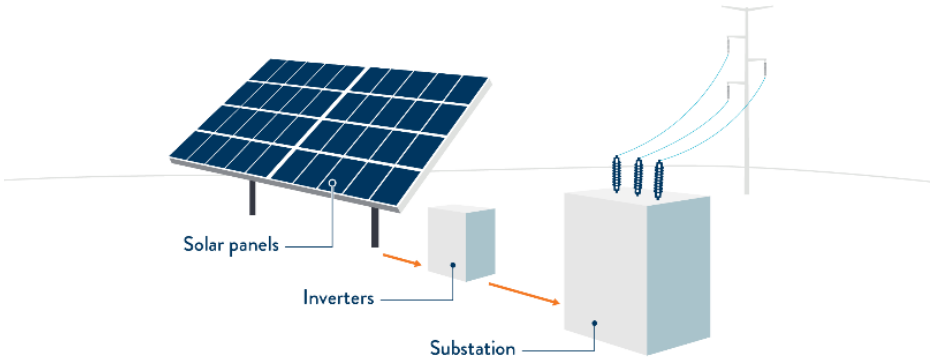
Figure 2. Photovoltaic Cell



Solar panels (sometimes referred to as solar modules) are made up of PV cells that generate direct current (DC) electricity, which must be converted to alternating current (AC) electricity before reaching the electrical grid. Solar panels are arranged into electrically connected blocks and connected to inverters. An inverter converts DC electricity to AC electricity. Transformers then step up the electrical voltage before the electrical power is collected through an above- or below-ground collection system. Collection systems combine the electricity from across the array and deliver it to a project substation. Figure 3 shows a simplified schematic of the major components of the solar generating facility.

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

Figure 3. Solar Facility Schematic

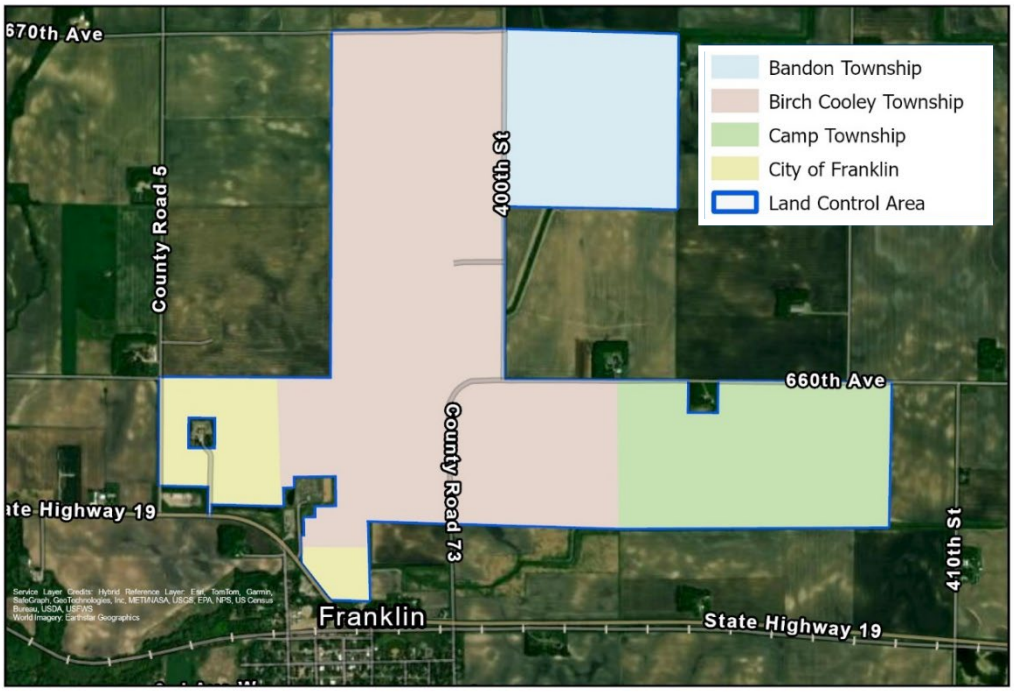


2.1.2 Where is the Project located?

The Project is located in Birch Cooley, Camp, and Bandon Townships and the city of Franklin in Renville County, Minnesota (Figure 4).

As shown in Figure 4, the proposed solar facility is located in Birch Cooley, Camp, and Bandon Townships and the city of Franklin in Renville County. Minnesota State Highway 19 (TH 19) runs east-west immediately south of the site, County State Aid Highway 5 (CSAH 5) runs north-south along the westernmost portion of the site, and County Road 73 (CR 73) runs north-south through the central southern portion of the site. Table 2 summarizes the project location by township, range, and section. The solar facility would be located on approximately 768 acres within an area of approximately 1,041 acres of land owned or leased by the applicant. Ninety-seven percent of the site is currently used as cultivated farmland, with the remaining 3 percent consisting of minimal tree cover, county drainage ditches, farmsteads, and township and county roads.

Figure 4. Township and Municipal Boundaries



Birch Coulee Solar selected the project site based on proximity to existing electric transmission infrastructure, sufficient solar resource, landowner participation, ease of development, and lack of sensitive resources.[10]

Table 2. Project Location

Township	Range	Sections	Township	County
113N	34W	36	Birch Cooley	Renville
112N	34W	1,2	Birch Cooley (City of Franklin)	Renville
112N	33W	6	Camp	Renville
113N	33W	31	Bandon	Renville

[10] SPA, pp. 7 – 8.

2.1.3 How is the solar facility designed?

The project will consist of will consist of PV panels, trackers, inverters, transformers, access roads, security fencing and gates, below-ground electric collection and communication lines, a project substation and interconnection facilities, metering equipment, step-up transformers, supervisory control and data acquisition (SCADA) system, an operation and maintenance (O&M) building (if located on site), one temporary and three permanent weather stations, a stormwater management system, temporary and permanent laydown yards, and a short aboveground 115 kV transmission line.

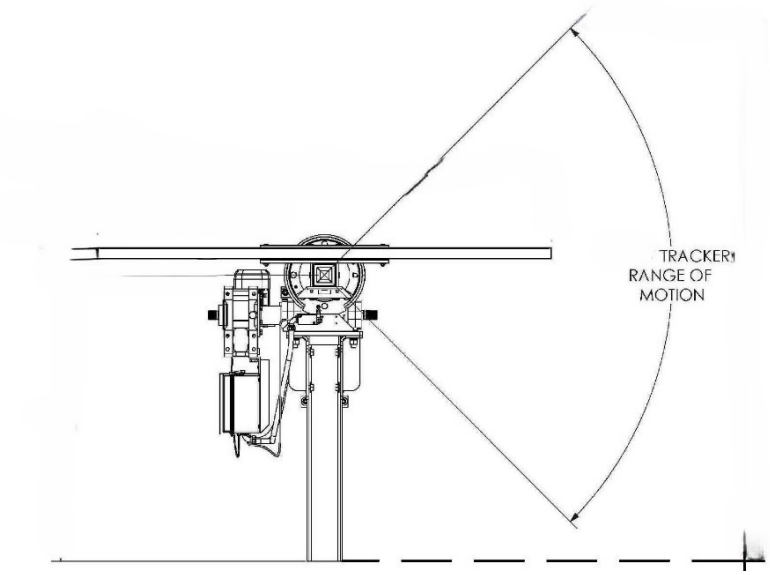
2.1.3.1 Solar Arrays

Although design and equipment specifications have not been finalized, Birch Coulee Solar's current design assumes using a Jinko 580W module with dimensions of 7.5 feet long, 3.75 feet wide, and 1.2 inches thick.[11] Birch Coulee Solar notes that final panel selection may change prior to construction. The PV panels are anticipated to have tempered coated dual glass, a tilt angle range of ± 50 degrees, and approximately 24 inches of ground clearance. The panels will be affixed to single-axis tracker racking systems supported by vertical steel piles driven into the ground, with roughly 14 feet between trackers. Arrays are anticipated to be arranged in approximately 530 north-south oriented rows, allowing the panels to track the sun from east to west (Figure 5). Small motors on the racking system rotate the panels on a single point to follow the sun throughout the day, tilting east in the morning, paralleling the ground at zero degrees mid-day, and tilting west in the afternoon (Figure 6[12]). This tracking of the sun maximizes the project's electrical production. When level to the ground, solar panels will be 4-6 feet above the ground,[13] and when tilted to their highest position (early and late in the day), the top edge of the solar panels will be at 8-10 feet above the ground. The project will require approximately 290,948 PV panels to establish the up to 125 MW AC capacity mounted on an estimated 4,061 single axis trackers.[14,15]

Figure 5. Typical Solar Array

[11] EA, Appendix C, Question 5.
[12] SPA, p. 12, Figure 2: Typical Tracker Profile.
[13] EA. Appendix C, Question 5.
[14] SPA, pp. 10 – 12.
[15] SPA, Appendix G: Decommissioning Plan.

Figure 6. Typical Solar Tracking Profile



2.1.3.2 Electrical Collection System

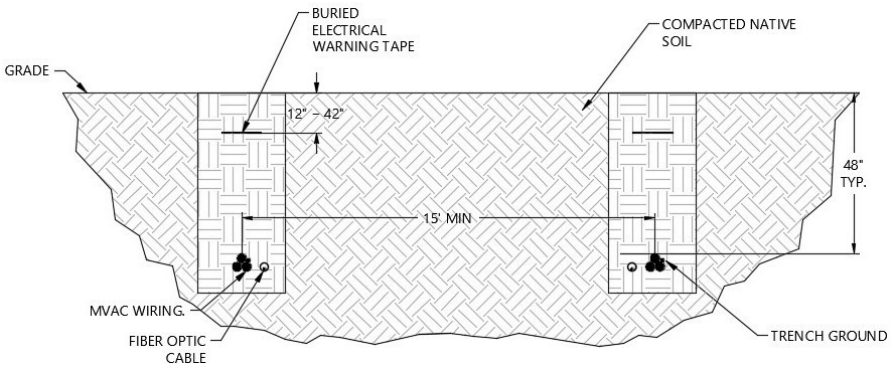
The direct current (DC) electrical energy generated by the solar panels (about 1,500 volts DC) will be delivered to approximately 36 inverters through underground cables. The inverters convert the electricity to about 630 volts (depending upon inverter specifications) alternating current (AC) and then the transformer will step up the power to 34.5 kV for transmission through an underground collector system to the project substation. Power inverters will be placed on inverter "skids" on top of concrete slab or steel pile foundations approximately 8 feet wide by 20 feet long. The inverters may be surrounded by approximately 4 to 6 feet of sloped rock aggregate on each side.[16] Typical pad mounted transformers that will be located on the inverter skids are approximately 8 ft wide, 20 ft long, and 9 ft tall.[17] From a distance, inverters skids will look like one-half of a semi-trailer box (Figure 7[18]). The final number of inverters, currently anticipated to be 36, will depend on the inverters selected for the project as well as the final solar panel configuration. The use of concrete slabs or steel piles for inverter skids will be determined closer to construction.

Figure 7. Inverter

[16] EA, Appendix C, Question 6.
[17] SPA, p. 13.
[18] SPA, p. 13, Figure 3: Inverter Example.

Electrical energy (34.5 kV AC) will be transmitted from inverter skids to the project substation through underground cables (Figure 8). Cabling will be trenched or plowed into place to a depth of at least three feet. Trenches will be backfilled with suitable native subsoil followed by trench spoil and compacted, after which topsoil will be used to return the surface to its finished grade.[19,20] The anticipated total length of collection lines throughout the preliminary development area is approximately 8.8 miles.[21]

Figure 8. Underground Cabling



2.1.3.3 FENCING

All solar arrays will be fenced for security and to prevent public and larger wildlife access. Approximately 14.6 miles of permanent security fencing will be secured to wooden posts along the perimeter of the preliminary development area.[22] Arrays will be fenced in groupings and will not impact public access to CR 73. Fence posts along the fence line are anticipated to be directly embedded into the soil. Corner and gate posts are anticipated to be set in concrete foundations poured on site. The perimeter fencing around the project will be 7 feet tall woven wire topped with a 1-foot high-tensile smooth wire.[23,24] The perimeter fence will have a total of 19 locked gates at access points, laydown yards, and the substation.[25] Seven of the locked gates are the project access points:[26]

- The northern and southeastern portions of the project will be accessed via a total of six gates along CR 73.
- The southwestern portion of the project will be accessed via one gate along TH 19.

[19] SPA, p. 12.
[20] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[21] EA, Appendix C, Question 1.
[22] Id.
[23] SPA, p. 15.
[24] SPA, Appendix A: Maps, Map 3: Site Layout.
[25] EA, Appendix C, Question 2 & 3.
[26] SPA, p. 15.

2.1.3.4 ACCESS ROADS

Although the total length of access roads will depend upon final site design, the preliminary layout anticipates approximately 6.4 miles of graveled access roads. These roads will be used for operations and maintenance activities. Roads will be approximately 20 feet wide at entrance gates and 16 feet wide in other areas of the project. Access roads will have at least 2 feet of shoulder on each side to provide stability. The 16-foot-wide internal roads make up the majority of the total access road footprint (5.5 miles), while the 20-foot-wide entrance gate roads cover a smaller portion (0.9 miles).[27] Access road installation and use may result in temporary soil disturbance of up to 50 feet during construction. Following the construction phase, Birch Coulee Solar will restore any temporarily disturbed areas according to Minnesota Department of Agriculture (MDA) guidance.[28]

2.1.3.5 PROJECT SUBSTATION

The project substation is proposed to be located in the southwest portion of the project, adjacent to the existing Xcel Energy Franklin Substation (Figure 9). The substation will be located inside the project fence on clean rock and is estimated to occupy approximately 1.2 acres of agricultural land. The project substation will include a 34.5/115 kV step-up substation with metering equipment required for interconnection to the transmission grid. Other components of the substation include supporting structures for high voltage electrical structures, breakers, transformers, lightning protection, and control equipment according to the specifications of the Interconnection Agreement with the Midcontinent Independent System Operator (MISO).

Underground 34.5 kV collector lines from the inverters will deliver energy to the project substation. The collector system voltage will be stepped up from 34.5 kV to 115 kV at the substation and transmitted to either the proposed utility-owned switchyard or the PCO with the transmission owner via an overhead 115 kV gen-tie line. The 115 kV gen-tie line will be constructed with steel monopole structures at a maximum anticipated height of 100 feet. The installation depth of the steel monopole structures would be determined prior to construction by geotechnical study recommendations and engineering information.[29] If used, the switchyard will connect to the grid using the utility-owned ring-bus POI at the Franklin 115 kV substation.[30]

Figure 9 includes two 115 kV gen-tie lines, one connecting to the utility-owned switchyard, and one connected to the PCO with the transmission owner at the Franklin substation, to fully visualize the potential interconnection layouts. The final project layout will only include one of the proposed 115 kV gen-tie lines. Birch Coulee Solar will determine the final layout of the interconnection facilities and necessity of the gen-tie line and utility-owned switchyard in conjunction with the transmission owner. The project substation and proposed gen-tie line will be designed in compliance with the National Electrical Safety Code (NESC) and other applicable practices, standards, and codes.[31]

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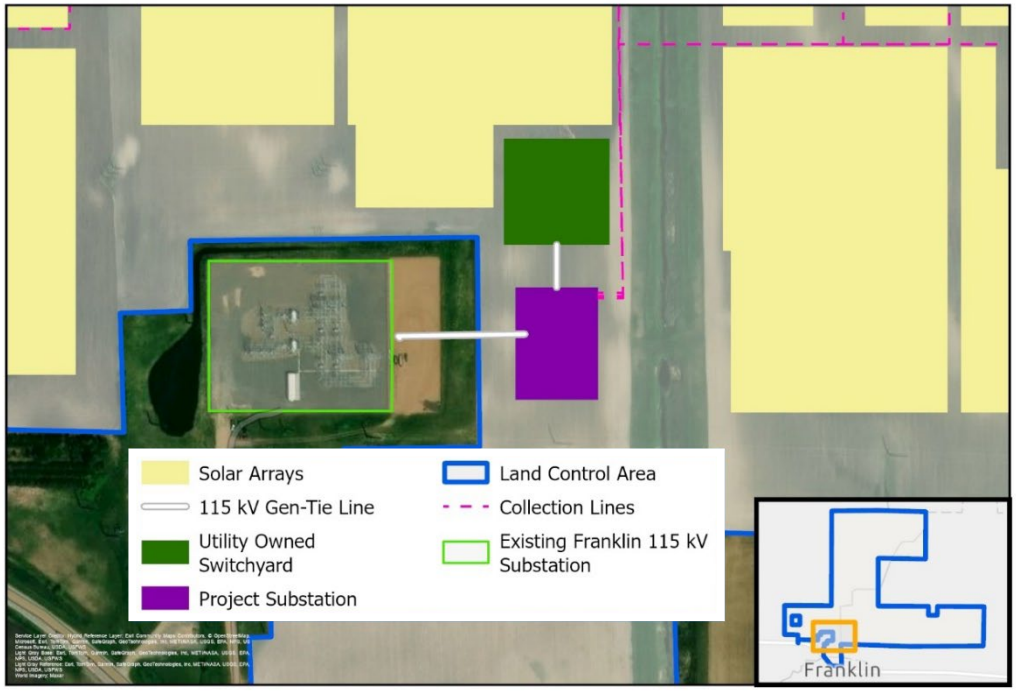
[27] EA, Appendix C, Question 1 & 7.
[28] SPA, p. 15.
[29] EA, Appendix C, Question 8.
[30] EA, Appendix C, Question 17.
[31] SPA, pp. 13-14.

Figure 9. Proposed Substation and Interconnection Facilities



FENCING

The fenced area of the project substation is expected to be a 7 ft high chain link security fence topped with a 1-foot-tall barbed wire strand. A lockable gate will be installed with the project substation fencing, and the final design of the fence will prevent the public and wildlife from gaining access to the facility. Substation fencing will be compliant with electrical codes and the National Electric Safety Code.[32]

2.1.3.6 OPERATIONS AND MAINTENANCE BUILDING

An O&M building will be used to house and maintain equipment and tools, including an emergency-use generator. Birch Coulee Solar may locate the O&M building within one of the permanent laydown yards or in an existing building near the project; the final location, acreage, and dimensions of the building has not yet been decided. Birch Coulee Solar will determine the specific location prior to construction.[33] Based on the size of the project, Birch Coulee Solar estimates that the O&M building, if located on site, would likely consist of two 9-foot by 40-foot Conex containers separated by a 20-foot by 40-foot metal overhead canopy. Additionally, a double wide mobile trailer with minimum

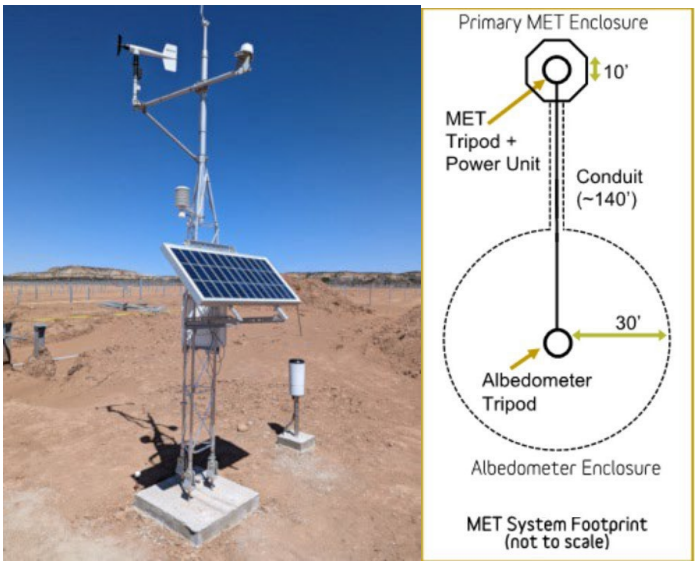
[32] SPA, p. 14.
[33] SPA, p. 16.

dimensions of 42 feet by 20 feet and a gravel parking area measuring 60 feet by 30 feet would be used.[34]

2.1.3.7 WEATHER STATIONS

Birch Coulee Solar plans to install 1 temporary weather station 18 months prior to project construction. The temporary weather station will be located near the center of the project at a spot agreed upon by a participating landowner. Birch Coulee Solar plans to install 3 permanent weather stations throughout the site to gather weather data such as wind speed and direction, ambient temperature, solar irradiance, etc. during the operation of the project. Weather stations will extend to a height of approximately 10 feet above ground level (Figure 10[35]).[36]

Figure 10. Typical Solar Weather Station



2.1.4 How would the solar facility be constructed?

Birch Coulee Solar anticipates that construction of the solar facility will begin in 2028 with an in-service date of 2030. This section summarizes construction activities. Unless otherwise noted, this summary has been adapted from Section 3.5.1 and Appendix D, the *Agricultural Impact Mitigation Plan* (AIMP), of the site permit application.

Originally, Birch Coulee Solar anticipated that construction would begin in 2027 with commercial operations beginning in 2028.[37] However, due to delays in the MISO process, Birch Coulee Solar now

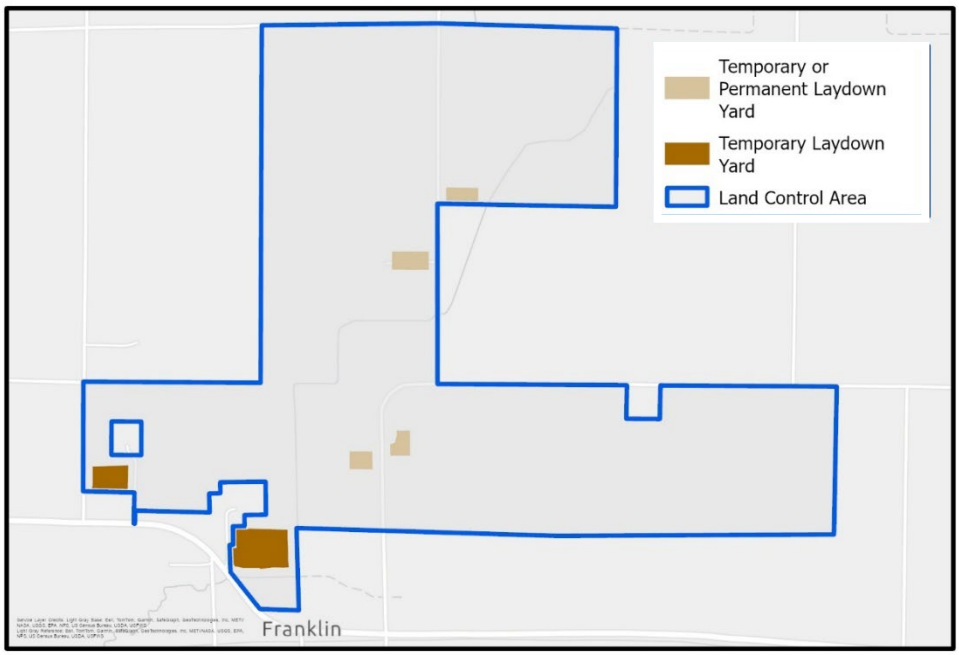
[34] EA, Appendix C, Question 4.
[35] SPA, p. 16, Figure 4: Typical Weather Station.
[36] SPA, p. 16.
[37] SPA, p. 3, Table 1-1: Estimated Project Schedule.

anticipates that construction will begin in 2028 to meet an in-service goal of 2030.[38] The actual construction schedule is dependent upon permitting, final design, delivery of equipment, and workforce availability.

Construction will begin after all necessary permits and approvals have been received including a large generator interconnection agreement from MISO. Project construction will begin with workforce and equipment mobilization and initial site preparation activities including construction entrance stabilization, surveying and marking of project components, installation of necessary security fencing, and grading. Construction will likely take place over two construction seasons.[39]

Birch Coulee Solar anticipates installing approximately six graveled laydown yards on 24.3 acres of the preliminary development area (Figure 11). Two of the laydown yards, approximately 14.5 acres, will be located outside of the preliminary development area in the southwestern portion of the project. These two yards, designated Temporary Laydown Yards, will be fenced for use during project construction, after which they will be restored in accordance with the project's vegetation management plan (VMP) and stormwater pollution prevention plan (SWPPP). Fencing for the Temporary Laydown Yards is anticipated to be a typical construction rental chain-link fence; the final design will be determined by the EPC contractor closer to construction.[40] The four remaining laydown yards, approximately 9.8 acres, are within the preliminary development area in the southcentral and northcentral portions of the project. These four yards, designated Temporary or Permanent Laydown Yards, will be used during project construction.

Figure 11. Temporary and Permanent Laydown Yards



[38] Birch Coulee Solar, Scoping Comments, October 25, 2024, eDockets Number 202410-211314-01.
[39] EA, Appendix C, Question 10.
[40] EA, Appendix C, Question 3.

After construction, some of the Temporary or Permanent Laydown Yards may continue to be used during project operation for vehicle parking and storage of spare parts and equipment. The Temporary and Permanent Laydown Yards that are not used for project operations will be restored in accordance with the project's VMP and SWPPP.[41] Birch Coulee Solar anticipates minimal grading due to slopes within the site falling primarily between zero and five percent.

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

Birch Coulee Solar estimates there will be between 10 and 20 semi-truck equipment deliveries daily during the peak of construction. This period of high semi-truck traffic volume will last for several months as the piles, trackers, and modules are delivered and will decrease once these components are delivered. Truck traffic will be lower prior to the peak of construction while other project components are delivered. During construction, traffic volume will mainly consist of light duty trucks and/or passenger vehicles used to transport workers to and from the construction site daily.[42]

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

Following initial site preparation, the access roads, trackers, modules, inverters, collection system, communication lines, gen-tie line, and project substation will be constructed. When feasible, some construction tasks will be performed concurrently.[44]

Access Roads

Construction of permanent site entrances and access roads will start with stripping and segregating topsoil from the roadbeds to a depth of up to 12 inches. Topsoil will be windrowed to the edges of the roadbed by pushing materials into stockpiles, loose compaction, and/or "tracking" with stormwater and wind erosion best management practices (BMPs). The sub-grade materials will then be compacted. After the access road gravel has been installed and compacted to the engineers'

[41] SPA, p. 16.
[42] SPA, p. 18.
[43] SPA, p. 18.
[44] EA, Appendix C, Question 10.

requirements, the project drainage ditches will be shaped according to the final grading plan. The previously stripped and windrowed topsoil will then be re-spread within the site.[45]

Solar Arrays

Solar array foundation will be installed first after road construction for a specific area. Pile-driving equipment will drive piles directly into the soil to an embedment depth of 6 to 9 feet. Foundation installation will minimize travel through each area. If soil conditions are wet and there is risk to damaging vegetation, mats (composite or wooden) will be used as needed to minimize impact.

After foundations have been installed, racking installation will begin. Racking components will be distributed across the array using lightweight equipment, with crew securing the racking. After the racking is installed, PV modules will be distributed between tracker rows and installed.

Project Substation

The boundary for the substation will be staked, followed by the installation of erosion and sediment control BMPs and grading. Next, the foundations will be installed, followed by the underground conduits and the grounding grid. After this is complete, the above-ground substation equipment will be delivered and constructed on the prepared foundations. Secondary containment areas for the transformer will be constructed as necessary and final grading will occur around the substation. Final construction activities for the project substation will include stringing the electrical wires, installing the perimeter fence, and placing rock throughout the interior of the fenced area and 3 ft outside the fence. Figure 12 provides a visual representation of a project substation.[46]

Figure 12. Typical Substation Design

[45] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[46] EA, Appendix C, Question 9.

Substation construction will occur simultaneously with the solar arrays. Topsoil will be stripped from the substation yard for construction. The sub-grade materials will be compacted and the spoils around the substation yard will be re-graded. Clean rock will be installed on the surface of the substation area. The stripped topsoil will be pushed outside of the substation area and windrowed or stockpiled for later use in designated locations in according with stormwater and wind erosion BMPs. When construction advances, the topsoil piles will be redistributed in a thin layer adjacent to the substation area.[47]

Utility-Owned Switchyard

The transmission owner would be responsible for designing, construction, and operating the switchyard. Switchyard construction would occur concurrently with other project-related construction activities. The switchyard would contain similar equipment to the existing equipment inside the Franklin substation, but the total footprint would be smaller. The switchyard would be fenced according to the fencing standards of the Franklin substation.[48]

Inverters and Step-up Transformers

The panels deliver direct current (DC) power to the inverters, where the power is converted to alternating current (AC). The voltage is then stepped up to 34.5 kV at the adjacent electric transformer. Inverter skids (each containing an AC-DC inverter, medium-voltage transformer, and power control electronics) will be installed on concrete pad or steel pile foundations. The typ e of inverter foundation will be determined closer to construction based on the geotechnical results and EPCF contractor's selection of equipment. Prior to installing inverters, the topsoil on the installation site will be stripped. The installation method may use techniques such as impact driving or vibratory characteristics, depending upon soil characteristics.[49] If concrete pad foundations are used, the concrete will either be mixed on-site or pads will be pre-made to project specifications off site and delivered.[50] The inverter foundations will be excavated using an excavator and rebar and concrete will be installed. Following concrete curing and strength testing, the subgrade soils around the inverters will be compacted. Once the concrete is set, the adjacent topsoil will be respread around the inverter.[51]

Electrical Collector System

Birch Coulee Solar anticipates using underground 34.5 kV DC collector cables within the arrays. The electrical collection system and associated communication lines will be installed below-ground for the AC electrical collection system in trenches at least 3 feet deep. Cable trenches may need to be deeper to avoid existing utilities or other features. Cabling will be done in accordance with the agricultural impact mitigation plan (AIMP) and multiple installation methods (e.g., trenching, plow method) may

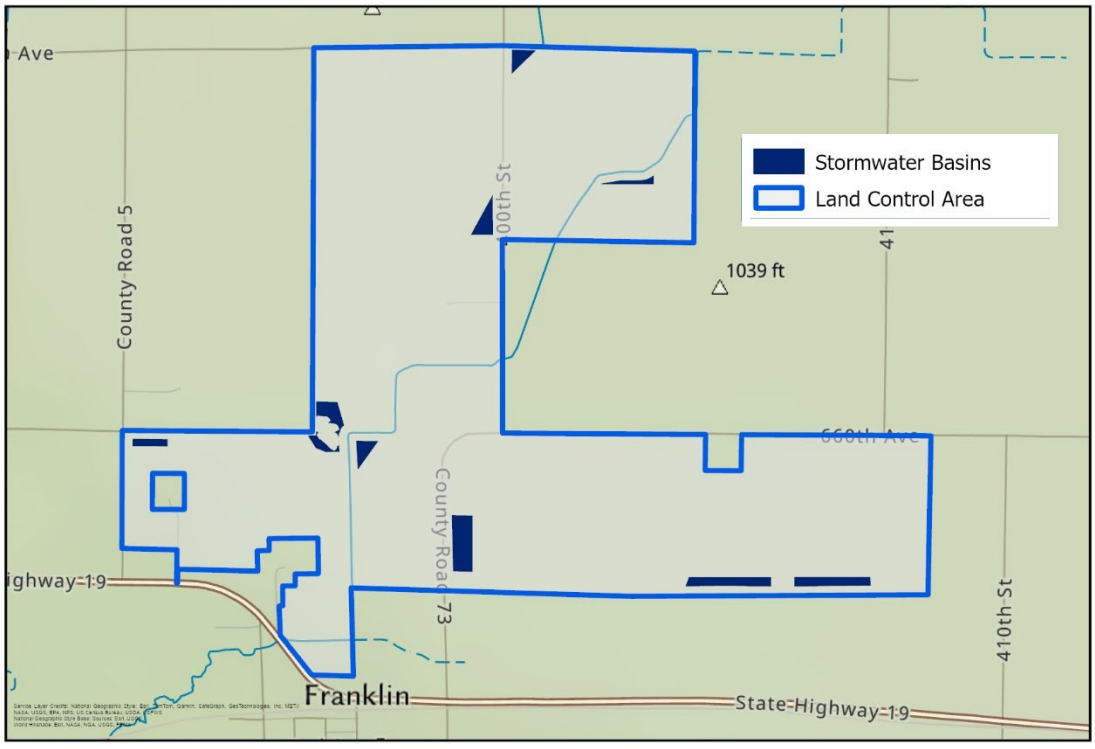
[47] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[48] EA, Appendix C, Question 17.
[49] EA, Appendix C, Question 10.
[50] SPA, p. 13.
[51] SPA, Appendix D: Agricultural Impact Mitigation Plan.

be used. The installation method will be determined based on site-specific conditions and will be consistent with general solar construction practices. Topsoil and subgrade materials will be excavated and segregated using typical excavating equipment or backhoes. The bottom of each trench may be lined with clean fill or imported bedding to surround the cables. Once cables have been installed on top of the fill or bedding materials, the trench will be backfilled with 1 foot of screened, native backfill subsoil followed by 2 feet of unscreened native backfill trench spoil. The material will be compacted as necessary. After compaction and settling the last foot of each trench will be backfilled with topsoil to return the surface to its finished grade.[52]

Stormwater Drainage

Birch Coulee Solar's project design will consider and incorporate offsite drainage patterns and maintain or reduce the discharge flow rate and erosion from existing site conditions. As part of its stormwater treatment system, Birch Coulee Solar indicates that it may include permanent stormwater detention or retention basins that release stormwater runoff at the site's existing or a reduced rate. The anticipated locations of the stormwater water detention or retention basins, shown in Figure 13, are preliminary and subject to change as the project design advances. This stormwater system will be designed to capture, route, and treat stormwater runoff for volume control and water quality per Minnesota's Construction Stormwater General Permit.

Figure 13. Preliminary Stormwater Basin Locations



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

The project design will incorporate the site's existing and proposed watershed conditions to minimize changes to the existing on- and off-site drainage flow paths during operations. A construction stormwater permit, and associated SWPPP, will be developed prior to construction and implemented during construction. The SWPPP will be in accordance with MPCA standards and guidance specific to solar projects and will include erosion and sediment control BMPs. The BMPs detailed in the SWPPP will minimize the potential for downstream water quality impacts throughout project construction and operation.[53]

FENCING

Birch Coulee Solar will install permanent security fencing around the perimeter of the project to prevent public and larger wildlife access. Fencing is anticipated to be woven wire fencing with a height of approximately seven feet from the ground with a 1-foot high-tensile smooth wire at the top. The perimeter security fence will have seven locked gates at entrance points.[54] Birch Coulee Solar will install motion-activated, down-lit operational lighting on poles along the perimeter fencing, project substation, and at entrances/exits for safety and security.[55]

RESTORATION

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

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

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[53] SPA, p. 15.
[54] SPA, p. 15.
[55] SPA, p. 31.
[56] Minnesota Statute 216B.1642.
[57] Minnesota Board of Water and Soil Resources Habitat Friendly Solar Program.
[58] SPA, Appendix F: Vegetation Management Plan.

2.1.5 How would the solar facility be operated and maintained?

Birch Coulee Solar estimates the service life of the project to be 30 years.[59] During the project's operational phase, a small maintenance crew will conduct regular maintenance and monitoring checks of the facilities. The small maintenance crew will be composed of three solar field technicians who will operate the project consistent with applicable state and federal safety regulations. The PV Control and SCADA equipment will communicate data streams to the remote Regional Operations and Control Center 24 hours a day and seven days a week. A remote regional O&M Engineering team and a Technical Services Team will support the local field technicians as needed.

The Computerized Maintenance Management System (CMMS) will be used to capture all maintenance required and performed on the project equipment. The system will generate preventative, predictive, and corrective tasks based upon the latest Original Equipment Manufacturer recommendations. The CMMS will create work order prioritizations and schedules that factor in safety, environmental conditions, criticality, and capacity. Birch Coulee Solar hopes to avoid unplanned, forced, or maintenance outages by using this preventative maintenance program.[60]

The operations team will be responsible for ensuring operations and maintenance are conducted in compliance with all applicable permits and regulatory requirements, industry practices, and manufacturer's recommendations. It is anticipated that 3 new full-time staff will operate and maintain the project.

The applicant indicates that a maintenance plan will be created for the project to ensure performance of the solar facility. All maintenance activities will be performed by qualified personnel. Maintenance activities will be performed during the day to the extent that they do not disrupt energy production, but some maintenance activities may be performed in the evenings to minimize lost generation. Maintenance activities that have the potential for substantial noise generation will be performed during the daytime to minimize impacts to residents.

Maintenance of the project will include inspection of electrical equipment, visual and noise inspections, vegetation management, and snow removal (as needed). The electrical performance of the project will be monitored in real-time by the SCADA system. The SCADA system allows for early notification of abnormal operations, which facilitates prompt maintenance and repair. On site personnel will have ready access to facility operating data and will be notified of faults and alarms as well as abnormal operations on a real time basis. Preventative maintenance tasks will be completed monthly for the O&M building and monthly, semi-monthly, or annually for the substation, depending on the specific task. Testing and maintenance of project components will be conducted semi-annually or annually depending on equipment manuals and manufacturer instructions.[61]

[59] SPA, p. 1.
[60] SPA, pp. 19-20.
[61] EA, Appendix C, Question 12.

Table 3. Regular Operations and Maintenance Tasks

Equipment	Task
PV Panels	Visual check of the panels, tracking system and surrounding grounds to verify the integrity of the panels and tracking structure, the presence of animals and nests, cleaning
Inverters, transformer, and electrical panels	Visual check of the devices including connection equipment and the grounding network, check for water and dust, component testing
Electric Boards	Check of the main switches and safety devices (fuses)
Noise	Check for abnormal sounds
Cabling and wiring	Visual check of electrical lines (where visible) and connection box to verify status
Transmission line	Routine visual inspection of transmission line, structures and components
Project substations	Scheduled visual inspections

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

As the project progresses through its service life and the solar market continues to produce less expensive and more efficient solar panels, Birch Coulee Solar may determine that repowering the project is a viable option. The decision to initiate repowering could be triggered by aging or faulty equipment, maintenance costs, extending the useful like of the solar panels, or increasing the project's generation output. Any repowering of the project will abide by all applicable local, state, and federal regulations. Site permits issued by the Commission specify the maximum generating capacity, so if repowering the project increased the generation capacity beyond Birch Coulee Solar's interconnection request of 125 MW, the existing site permit must be amended or a new site permit sought. At the end of the project's useful life, Birch Coulee Solar will either take the necessary steps to continue operation of the project (re-permitting and retrofitting) or will decommission the project.[62]

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

[62] SPA, p. 20.

and that the permittee is responsible for all costs associated with decommissioning the project. Birch Coulee Solar provided a draft decommissioning plan as Appendix G of its site permit application.

If Birch Coulee Solar does not repower the project, they will decommission and remove project facilities. Decommissioning would consist of removing the solar arrays (panels, racking, and steel posts), inverters, fencing, access roads, above-ground and below-ground portions of the electrical collection system, lighting, substation, and gen-tie line. Any below-ground cabling and conduits will be removed per the landowner lease agreements to a depth of four feet. On parcels where Birch Coulee Solar has purchase options, some below-ground facilities deeper than 4 feet may remain in place to limit vegetation and surface disturbance.[63]

Birch Coulee Solar anticipates that the total estimated cost to decommission the project is approximately $13,447,226 ($107,577 per MW).[64] Estimated salvage/scrap value of solar components is approximately $10,103,707, offsetting the cost and resulting in a net estimated decommissioning costs of $3,334,478.[65] The decommissioning bond will be posted no earlier than the tenth anniversary of operation. The cost of decommissioning will be updated every five years after the tenth year of operation.[66]

2.2 Project Costs

Birch Coulee Solar estimates the total capital costs to construct the project, including development, engineering, procurement, and construction (EPC), and interconnection, to be approximately $245 million (Table 4). Birch Coulee Solar indicates that actual total costs may vary up to 20%, as costs depend on the timing of construction, final panel selection, labor costs, taxes, and tariffs. The estimated project decommissioning cost, approximately $13 million, and component salvage value, approximately $10 million (Table 4), was created using 2024 dollars. The actual cost of decommissioning the project will be dependent on labor costs and the market value of salvageable components at the time of decommissioning. Birch Coulee Solar considers the estimate accuracy range for the total decommissioning cost to be -30 percent to +50 percent.

The project operation and maintenance costs include ground-based yearly inspections, lease payments, operational staff wages, taxes, and other inspection/maintenance. Birch Coulee Solar estimates the annual operation cost at approximately $1 million.[67]

[63] SPA, Appendix G: Decommissioning Plan.
[64] SPA, Appendix G: Decommissioning Plan, p. 7, Table 1: Estimated Decommissioning Costs.
[65] SPA, Appendix G: Decommissioning Plan, p. 8, Table 2: Estimated Net Decommissioning Costs.
[66] SPA, Appendix G: Decommissioning Plan.
[67] SPA, p. 21.

Table 4. Estimated Project Cost Ranges[68,69]

Project Component	Estimated Cost
Development, Financing, Engineering, Procurement, and Construction (Panels, Racking, Cabling, Inverters, Fencing, Transformers, Labor)	$229,500,000
Interconnection	$15,000,000
Project Gen-Tie Line	$500,000
Total Construction Cost	**$245,000,000**
Decommissioning	$13,477,226
Salvage Value	($10,103,707)
Total Project Cost	**$248,373,519**

2.3 Project Schedule

Birch Coulee Solar anticipates the project will begin commercial operation by the end of 2030. Table 5 shows Birch Coulee Solar's estimated development and construction milestones.

Table 5. Anticipated Project Schedule[70,71,72]

Activity	Anticipated Timeframe
Land Acquisition	Completed
MISO Interconnection Application	Q2 2020
Site Permit	Q2 2025
Downstream Permits	Prior to construction
Equipment Procurement and Contractor Selection	2026-2028
Construction	2028-2029
Testing and Commissioning	2029-2030
Commercial Operation Date	2030

[68] SPA, p. 21, Table 3-5: Project Cost Estimate
[69] SPA, Appendix G: Decommissioning Plan, p. 8, Table 2: Estimated Net Decommissioning Costs.
[70] SPA, p. 3, Table 1-1: Estimated Project Schedule.
[71] Birch Coulee Solar, Scoping Comments, October 25, 2024, eDockets Number 202410-211314-01.
[72] EA, Appendix C, Question 13.

3 Regulatory Framework

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

3.1 What Commission approvals are required?

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

The project requires a site permit from the Commission because it meets the definition of a *large electric power generating plant*, which means any electric power generating equipment designed for or capable of operation at a capacity of 50 MW or more (Minn. Stat. 216E.01, subd. 5). A Certificate of Need is not required for the project because of the exemption provided under Minn. Stat. 216B.243.[73] The exemption applies to "any solar generating system…for which a Site Permit application is submitted by an independent power producer." Birch Coulee Solar is an independent power producer, and therefore exempt from the Certificate of Need requirement in Minn. Stat. 216B.243.

3.2 What is environmental review?

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

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

Minnesota law provides the Commission with two processes to review site permit applications. The alternative process, which applies to solar generating facilities, such as the project, requires that an EA be prepared and a public hearing be held.[74,] On May 23, 2024, Birch Coulee Solar filed a Notice of Intent informing the Commission of their plan to submit a site permit application for the project under the alternative review process.[75]

3.3 What permitting steps have occurred to date?

The Commission accepted the site permit application as complete on September 10, 2024. Public information and scoping meetings were held in Franklin, Minnesota on October 9, 2024, and online on October 10, 2024.

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[73] Minnesota Statute 216B.243, subd. 8(a)(7).

[74] 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.

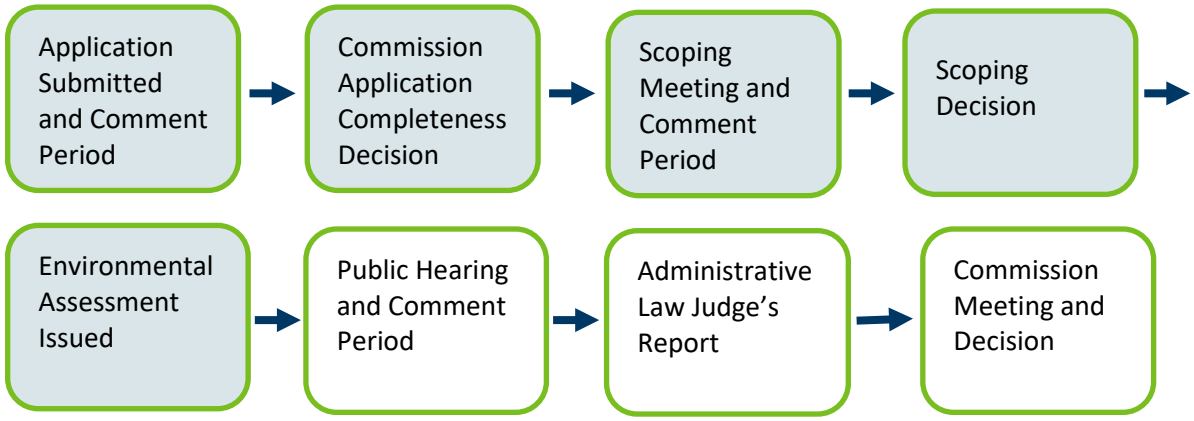
[75] Birch Coulee Solar, Initial Filing, May 23rd, 2024, eDockets Number 20245-207068-01.

Application Filing and Acceptance

Birch Coulee Solar filed an application for a site permit on July 29, 2024.[76] The Commission accepted the application as substantially complete in its order dated September 10, 2024.[77] The order also referred the matter to the Office of Administrative Hearings (OAH) for appointment of an ALJ to conduct a public hearing for the project. Commission staff provided a *Sample Site Permit for a Solar Energy Generating System* on October 7, 2024.[78]

Figure 14. outlines the permitting process as it has unfolded for this project.

Figure 14. Permitting Process Summary[79]



Scoping Process

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

Scoping includes a public meeting and comment period that provide opportunities for interested persons to help develop the scope (or contents) of the EA.[80] The purpose of the public information and scoping meetings is to provide information and answer questions about a proposed project and the permitting process. The meeting and associated comment period also provides an opportunity to gather input regarding potential impacts and mitigative measures that should be studied in the EA.

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[76] Birch Coulee Solar Project, Application to the Minnesota Public Utilities Commission for a Site Permit for a Large Electric Generating Facility, July 29th, 2024, eDockets Numbers 20247-209066-01 (through -09), 20247-209069-01 (through -08).
[77] Commission, *Order*, September 10th, 2024, eDocket ID: 20249-210084-01.
[78] Commission Staff, Sample Solar Site Permit, October 7, 2024, eDockets No. 202410-210744-01.
[79] Read from left to right; shaded steps are complete.
[80] Minn. R. 7850.3700, subp. 2.

On September 23, 2024, the Commission and Commerce issued a joint *Notice of Public Information and Environmental Assessment Scoping Meeting* and associated public comment period.[81] The notice was sent to those individuals on the project contact list and was also available on Commerce's webpage for the project.

Commission and Commerce staff held public information and scoping meetings in Franklin, Minnesota on October 9, 2024, and an online meeting on October 10, 2024. The comment period closed on October 25, 2024. Approximately 25 people attended the Franklin meeting, and six attendees provided public comments. There were no public comments at the online meeting.[82] Written comments were received from eighteen citizens, Renville County staff, two state agencies, two labor unions, and the applicant.[83]

Public comments addressed a number of potential impacts and concerns related to the project including labor; effects of construction on drainage, wetlands, traffic, and noise; safety concerns related to trunk highway access points, emergency services, setbacks, and blowing snow; financial assurances for drain tile repair, panel replacement, and decommissioning; aesthetic impacts and property values; and the impacts of fencing, dust control, lighting, tree removal, and erosion control methods on wildlife.

Birch Coulee Solar filed comments on November 6, 2024.[84] Birch Coulee Solar did not object to any of the topics raised in public comments being considered in the EA and responded to comments regarding the use of local labor for the project and blowing snow concerns.

Scoping Decision

The scoping decision identifies the issues studied in this EA.

After considering public comments and recommendations by staff, Commerce issued a scoping decision on November 25, 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

[81] Commission and Commerce, *Notice of Public Information and Environmental Review Scoping Meeting*, September 23rd, 2024, eDocket ID: 20249-210406-01.
[82] Oral Comments on the Scope of Environmental Assessment, Public Scoping and Information Meetings, Franklin, Minnesota, October 9th, 2024 and virtual meeting, October 10th, 2024, eDocket ID: 202411-212174-01.
[83] Written Comments on the Scope of Environmental Assessment, eDocket ID: 202411-211553-01.
[84] Birch Coulee Solar, Comments, November 6th, 2024, eDockets: 202411-211682-01.

must be obtained by the permittee prior to construction.[85] Table 6 lists potential downstream permits that might be required, several of which are discussed below.

3.4.1 Federal

The U.S. Army Corps of Engineers (USACE) "regulates the discharge of dredged or fill material into waters of the United States, including wetlands."[86] Dredged or fill material, including material that moves from construction sites into these waters, could impact water quality. A permit is required from USACE if the potential for significant adverse impacts exists. The USACE is also charged with coordinating with Indian tribes regarding potential impacts to traditional cultural properties.

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

A permit is required from the U.S. Fish and Wildlife Service (USFWS) for the incidental taking[87] of any threatened or endangered species. As a result, USFWS encourages project proposers to consult with the agency to determine if a project has the potential to impact federally listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Table 6. Potential Downstream Permits

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

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

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

[87] 16 U.S. § 1532(19) (defining "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct).

Unit of Government	Type of Application	Purpose	Anticipated for Project
	Section 10 Endangered Species Incidental Take Permit	Potential impacts on federally endangered/threatened species	Possible
State			
Department of Natural Resources	State Threatened and Endangered Species Consultation	Consultation to mitigate impacts to state-listed species	Yes
	Water Appropriation Permit	Balances competing management objectives; may be required for construction dewatering	Possible
	Public Waters Work Permit	Required to work in public waters	No
Minnesota Pollution Control Agency	Construction Stormwater Permit	Minimizes temporary and permanent impacts from stormwater	Yes
	Section 401 Clean Water Act – Water Quality Certification	Ensures project will comply with state water quality standards	Possible
	Storage Tank Registration	Required for back-up generator aboveground storage tank >500 gallons and belowground storage tank >110 gallons	Possible
	State Air Registration Permit	Required for backup generators if they do not qualify for an exception	Possible
State Historic Preservation Office	National Historic Preservation Act Section 106 Consultation	Ensures adequate consideration of impacts to significant cultural resources	Yes
Department of Agriculture	Agricultural Impact Mitigation Plan	Establishes measures for protection of agricultural resources	Yes
Department of Labor and Industry	Electrical Inspection	Necessary to comply with electric code.	Yes
Department of Transportation	Utility Accommodation on Trunk Highway ROW Permit	Controls utilities being placed along or across highway rights-of-way (ROW)	Possible
	Oversize/Overweight Permit	Controls use of roads for oversize or overweight vehicles	Possible
	Access Driveway Permit	Required for access driveways off of DOT roads	Possible
Department of Health	Well Construction Permit	Installation of a water supply well	Possible
Board of Water and Soil Resources	Wetland Conservation Act	Coordination with BWSR and Renville County to ensure conservation of wetlands	Possible
Local			

Unit of Government	Type of Application	Purpose	Anticipated for Project
Renville County (and/or the Townships of: Birch Cooley, Bandon, and/or Camp); City of Franklin	Transportation Permit	Required for transporting oversized and overweight loads on County roadways.	Possible
	Access Driveway/Entrance Permit	Required for moving, widening or creation a new driveway access to County roads	Possible
	Work Permits	Miscellaneous permits	Possible
	Septic System Permit	Needed prior to installation of a septic system	Possible
	Building Permit	Needed for new construction in Renville County	Possible
	Work in right-of-way Permit	Needed to work within county road ROWs	Possible
	Utility Permit	Needed to construct or maintain electrical lines along or across county highway right-of-way	Possible
Renville County Soil and Water Conservation District (SWCD)	Minnesota Wetland Conservation Act Approval	Activities affecting water resources	Possible

3.4.2 State

Potential impacts to state lands and waters, as well as fish and wildlife resources, are regulated by the Minnesota Department of Natural Resources (DNR). Licenses are required to cross state lands or waters.[88] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a *Public Waters Work Permit*.[89] Utility infrastructure that will be crossing DNR managed lands require the agency to provide a *Utility Crossing License*.[90] Not unlike the USFWS, DNR encourages project proposers to consult with the agency to determine if a project has the potential to impact state-listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Construction projects that disturb one or more acres of land require a general *National Pollutant Discharge Elimination System / State Disposal System Construction Stormwater Permit* ("CSW Permit") from the MPCA. This permit is issued to "construction site owners and their operators to prevent stormwater pollution during and after construction."[91] The CSW Permit requires use of best management practices; development of a SWPPP; and adequate stormwater treatment capacity once the project is complete. Projects must be designed so that stormwater discharged after construction

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

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.[92]

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

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

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

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

The Minnesota Department of Labor and Industry requires an electrical inspection as a component of an electrical permit.[94]

A permit from the Minnesota Department of Transportation (MnDOT) is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way (ROW).[95] Coordination would be required to construct access roads or driveways from trunk highways.[96] These permits are required to ensure that use of the ROW does not interfere with free and safe flow of traffic, among other reasons.[97]

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

[93] 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.

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

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

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

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

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

3.4.3 Local

Renville 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."[98]

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.

Renville County local permits may be required as a component of this project, including[99]:

- Transportation Permit to transport oversized and overweight loads on county roadways.
- Access Driveway/Entrance Permits in order to move, widen or create a new driveway access to county roads.
- Installation of Object/Structures Within County Highway Right-of-Way (Utility Permit) in order to install a utility within the highway right-of-way.
- Subsurface Sewage Treatment Systems Permit which must be given prior to the installation of any individual sewage treatment system in the County.

3.5 Do electrical codes apply?

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

The project must meet requirements of the NESC.[100] Utilities must comply with the most recent edition of the NESC, as published by the Institute of Electrical and Electronics Engineers, Inc., and approved by the American National Standards Institute, when constructing new facilities or upgrading existing facilities.[101] These standards are designed to safeguard human health "from hazards arising

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

[99] Renville County, Public Works Department Permits: Public Works - Renville County; Renville County, Environmental Services Department Permits: Environmental Services - Renville County.

[100] *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).

[101] Minnesota Statute 326B.35.

from the installation, operation, or maintenance of conductors and equipment in electric supply stations and overhead and underground electric supply lines."[102] They also ensure that facilities and all associated structures are built from materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided operational maintenance is performed.

The project must be designed to meet North American Electric Reliability Corporation's requirements,[103] which define the reliability requirements for planning and operating the electrical transmission grid in North America.[104]

3.6 Are any issues outside the scope of this EA?

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

The EA will not address following topics:

- Any site alternative other than the project site proposed by the applicant and identified in the scoping decision.
- The manner in which landowners are compensated for the use or sale of their land for the project.

[102] 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.

[103] EA, Appendix B (DSP), Section 4.5.1

[104] North American Electric Reliability Corporation (2017) *Standards*, http://www.nerc.com/pa/stand/Pages/default.aspx

4 Project Impacts and Mitigation

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

4.1 How are potential impacts measured?

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

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

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

4.1.1 Potential Impacts and Mitigation

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

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

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

- Negligible impacts do not alter an existing resource condition or function and are generally not noticeable to an average observer. These short-term impacts affect common resources.
- Minimal impacts do not considerably alter an existing resource condition or function. Minimal impacts might, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources over the short- or long-term.

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

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

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

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

4.1.2 Regions of Influence

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

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

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

Table 7. Regions of Influence for Human and Environmental Resources

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

4.2 Project Setting

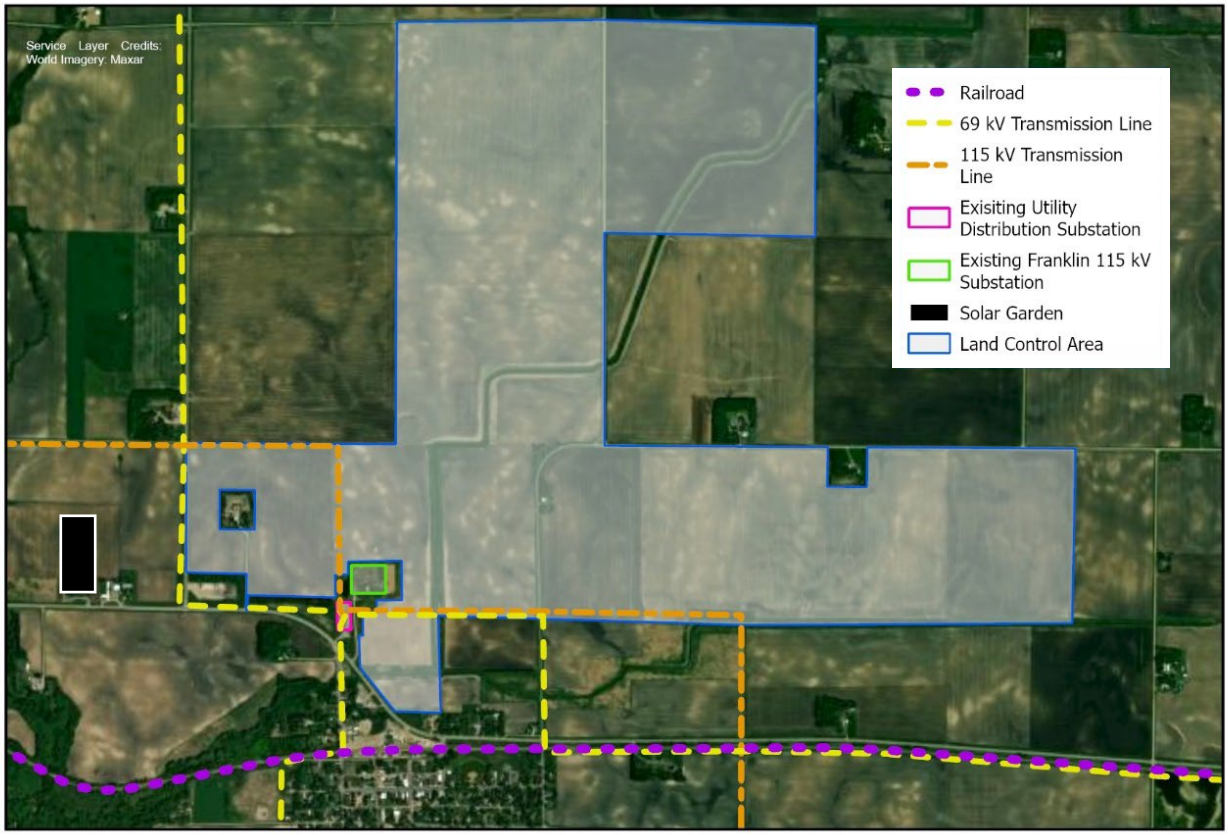
The project is in a rural area, immediately north of TH 19 and the city of Franklin in Renville County. The project area is dominated by agricultural land uses and scattered farmsteads, with developed areas in Franklin. Wooded areas are common around the farmsteads. There is also an existing substation in the project area.

The proposed solar facility is located in Birch Cooley, Bandon, and Camp townships, adjacent to and partially within the northern portion of the city of Franklin in Renville County, Minnesota. The solar facility is north of TH 19 (Figure 1). Views are broad and expansive, but typically interrupted by farmsteads and residences or developed areas of the city of Franklin. Most of the structures are fully or partially surrounded by wooded shelterbelts.

The topography of the project site is flat and gently rolling, with the majority of the site in the 0 to 5 percent slope range. The average site elevation 1,014.6 feet.[105] The topography is underlain by diamicton or unsorted sediment with a fine-grain matrix overlaying clay and shale, with less abundant sandstone and minor lignite. Portions of surficial geology may have washed till capped with coarse-grained lag.

The project is in the Minnesota River Prairie (251Ba) subsection of the North Central Glaciated Plains Section of the Prairie Parkland Province.[106] Pre-settlement vegetation was primarily tallgrass prairie, with many islands of wet prairie scattered throughout. Deciduous floodplain forests of silver maple, elm, cottonwood, and willow occurred along the Minnesota River and other streams. The current land-use in the project area is predominately agricultural.

Figure 15. Project Area Energy Infrastructure



Land use within the area of land control is dominated by agriculture; approximately 97 percent of the 1,041.6-acre land control area is currently used for cultivated agriculture (primarily corn and soybeans). Built features common to the area include residences and buildings, paved and gravel roads, and county drainage ditches. There are also

[105] EA, Appendix C, Question 11.
[106] DNR (n.d.) *Ecological Classification System: Ecological Land Classification Hierarchy*, retrieved from: https://www.dnr.state.mn.us/ecs/index.html

several energy infrastructure projects in the region. The Franklin 115 kV substation and associated infrastructure is located in the southwestern portion of the project site. There are two transmission lines; one 69 kV line runs along the southern and western perimeter of the site and one 115 kV line, owned by Xcel Energy, runs along the southern and western portion of the site, passing through the site near the Franklin 115 kV substation (Figure 15). The Twin City & Western Railroad has one active rail line, primarily operated by the Minnesota Prairie Line, Inc., that runs through the city of Franklin. A small, community-scale solar garden is west of the land control area across CR 5. There are no known pipelines within the project area.

4.3 Human Settlement

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

4.3.1 Aesthetics

The ROI for aesthetics is the project area. The project will introduce new manmade structures into the existing landscape. Portions of the project will be visible from local roads, and nearby residences. For most people who pass through the project area on TH 19, County Highway 5, CR 73, 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. Generally, an intact and harmonious viewshed is considered by many to be more aesthetically pleasing. Viewsheds might be important regardless of whether they are considered beautiful by the observer, for example, a scattered stone foundation of a historical resource.

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

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

Figure 16. Existing Viewshed of Birch Coulee Solar Project – TH 19

The existing landscape in the project is area is rural and agricultural consisting of flat to gently rolling agricultural crop fields of corn and soybeans, with the surrounding area also supporting a variety of wooded shelterbelts, wetlands and drainages. Figure 16 shows the existing viewshed of the area off of TH 19 facing north towards the project location. Figure 17 shows the existing viewshed of the area off of CR 73 facing southeast (A) and southwest (B) towards the project location.

Figure 17. Existing Viewshed of Birch Coulee Solar Project –CR 73

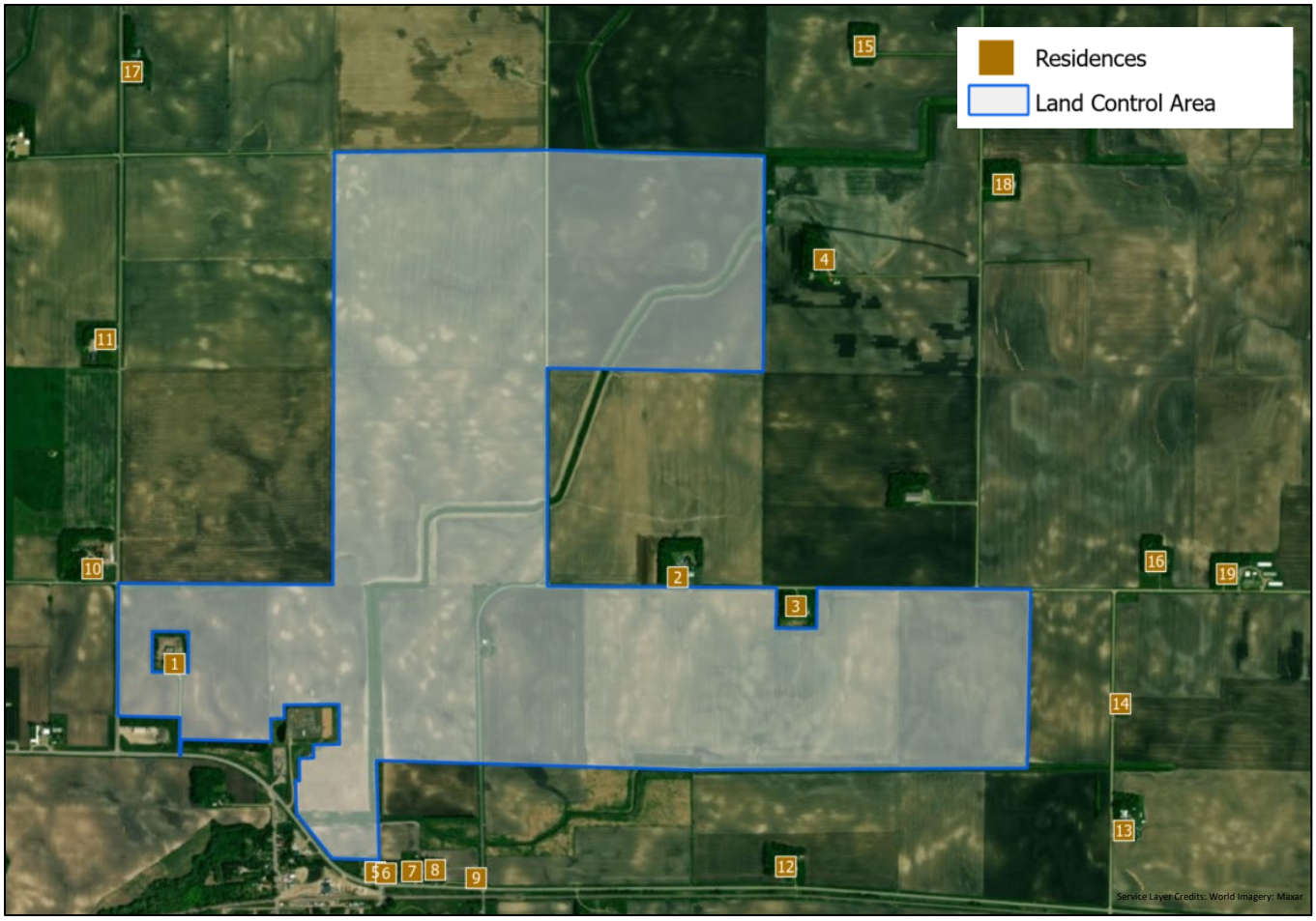
The built environment in the project area includes the city of Franklin south of the project, several agricultural facilities and township and city roads. Existing infrastructure includes two transmission lines, a community-scale solar garden, and the Franklin 115 kV substation. Residences and farmsteads are scattered around the nearby landscape, mostly surrounded by woodlands or shelterbelts. The Franklin softball field, Veteran's Memorial, and a picnic pavilion lie south of the project across TH 19 (Figure 18).

As shown in Figure 19, there are 14 residences within .25 miles of the project site. One of these residences, Residence #1, is surrounded by the area of land control. Residence #1, located on the north side of TH 19, is the nearest home to the solar facility, approximately 240 feet from the nearest solar panel and 435 feet away from the nearest inverter.[107,108] Built features common to the area include residences and buildings, paved and gravel

[107] SPA, p. 42
[108] EA, Appendix C, Question 15.

roads, drainage ditches, community-scale solar facilities, and transmission lines. TH 19, which runs east-west south of the project, is part of the Minnesota River Valley Scenic Byway.

Figure 19. Residences within Local Area



POTENTIAL IMPACTS

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

The project will be a noticeable change in the landscape, converting approximately 768.2 acres of agricultural fields into solar production. Although the change will be noticeable, there are other existing infrastructure features in the landscape including gravel roads, transmission and distribution lines, a 115 kV substation, and a community-scale solar facility. The project will be immediately adjacent to the existing Franklin 115 kV substation that already operates in the area. How an individual viewer perceives the change from a field of corn or soybeans to a field of solar panels depends, in part, on how a viewer perceives solar panels. Will the viewer consider the harvesting of solar energy to be like harvesting crops or will the viewer see an agricultural use be replaced by an industrial use?

For residents outside the project vicinity and for others with low viewer sensitivity, such as travelers on surrounding roads, aesthetic impacts are anticipated to be minimal. For these viewers, the solar panels would be relatively difficult to see due to fencing and vegetation or would only be visible for a very short period. For residents traveling on local roads in the project vicinity, such as CR 73, and for others with high viewer sensitivity, such as Franklin residents using the softball field or motorists traveling on TH 19 as part of the Minnesota River Valley National Scenic Byway, aesthetic impacts are anticipated to be moderate to significant. While the existing tree cover does minimize impacts to the viewshed when looking north towards the project from TH 19 or the city of Franklin, some degree of visibility will remain. Although there are smaller solar facilities in the project area (Figure 15), this project is much larger than existing solar facilities.

Current fields of corn and soybeans will be replaced with acres of solar panels. Panels will have a relatively low profile, when level to the ground they will be 4 to 6 feet tall, with a maximum height of 8-10 feet off the ground at maximum tilt.[109,110] Construction of the new 1.2-acre project substation, the associated transmission line and the O&M building will also present new visual impacts. If built on site, the O&M building will include the SCADA system, an area for maintaining and storing equipment, and a parking lot. The project's overhead transmission line will be constructed with steel monopole structures not anticipated to exceed 100 feet in height, and the entire length of the line will be less than 500 feet. The nearest residence is approximately 1,950 feet from the project transmission line.[111] In addition, an existing 115 kV transmission line and 69 kV transmission line are presently located adjacent to and within the land control area.

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

Down-lit security lighting will be installed at the gates to the facility as well as outside the O&M building and project substation, and along the perimeter fence as necessary for safety and security. Lighting will be motion-activated and down lit to minimize impacts and effects.[112] Impacts to light-sensitive land uses are not anticipated given the rural project location coupled with minimal required lighting for operations.

MITIGATION

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

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

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[109] SPA, p. 21
[110] EA, Appendix C, Question 5.
[111] EA, Appendix C, Question 15.
[112] SPA, p. 31

Site-specific landscaping plans can minimize visual impacts to adjacent land uses and homes through vegetation screening, berms, or fencing. Birch Coulee Solar indicates that although nearby residences have some natural vegetation screening from the project, further discussion with affected landowners is in progress. Birch Coulee Solar will work with adjacent landowners to determine the need for additional vegetation screening and landscaping to minimize aesthetic impacts of the project. Renville County has requested the Birch Coulee Solar mitigate aesthetic impacts by planting two rows of staggered evergreen trees along roadways and in front of residences.[113]

Aesthetic impacts can also be mitigated through individual agreements with neighboring landowners (sometimes referred to as good neighbor agreements). Agreements covering individual residences are not within the scope of this EA. Section 5.1 of the DSP is a special condition that requires the permittee to coordinate with jurisdictional road management authorities to develop vegetative screening plans for state, county, and township roads adjacent to or bisecting the project. Vegetative screening plans must comply with jurisdictional ROW management and/or setback requirements.

No additional mitigation is proposed.

4.3.2 Noise

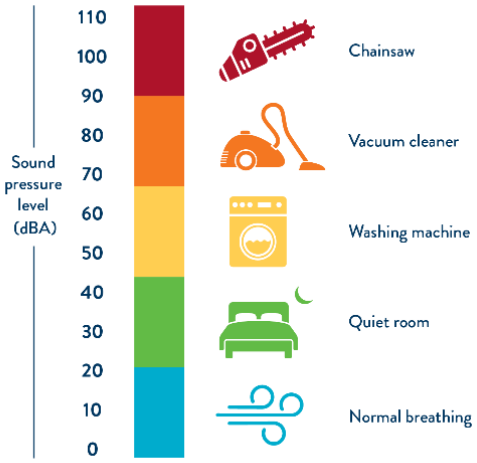
The ROI for noise is the local vicinity. Distinct noises are associated with the different phases of project construction. The impact intensity level during construction will range from **negligible to significant** depending on the activity. Potential impacts are anticipated to be intermittent and short-term.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

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.[114] 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 20 provides decibel levels for common indoor and outdoor activities.[115]

[113] Written Comments on the Scope of Environmental Assessment, p. 5, eDocket ID: 202411-211553-01.
[114] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[115] Federal Aviation Administration (February 9, 2018) *Fundamentals of Noise and Sound*, retrieved from: https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/.

Figure 20. Common Noise Levels



Because sound levels are measured on a logarithmic scale, they are not directly additive. "A doubling of sound energy yields an increase of three decibels."[116] For example, if a sound level of 50 dBA is added to another sound level of 50 dBA, the total sound level is 53 dBA, not 100 dBA. This change in sound level (three dBA) would be barely detectible.

All noises produced by the project must be within state noise standards.[117] Noise standards in Minnesota are based on *noise area classifications* ("NAC") corresponding to the location of the listener, referred to as a receptor. NACs are assigned to areas based on the type of land use activity occurring at that location. Household units, designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3.

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

[116] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[117] Minnesota Rule 7030.0050.

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

Potential Impacts

The ROI for noise is the project vicinity (1,600 feet). The primary noise receptors are the local residences. Although there are no residences with the land control area, there are 14 residences in local proximity (within 0.25 miles),[118] one of which is surrounded by the land control area (Residence #1, Figure 19). The proposed project is in a rural, agriculturally dominated area. Rural noise levels typically range from 30-55 dBA depending on the activity, time-of-day, weather, and season. The project vicinity's existing sound character also includes audible traffic sounds from Minnesota State Highway 19, which runs across the southern edge of the project, and operational sounds from the existing Franklin 115 kV substation, which is adjacent to the southwestern portion of the project.[119] 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

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

Major noise producing activities related to installation of the solar arrays are associated with clearing and grading, material delivery, and driving foundation posts. The intermittent noise created by the construction vehicles and equipment used for these activities will be limited by the NAC-1 L_{10} metric. The majority of the construction equipment that could be used on the site, such as grading equipment, man-lifts, and compactors, is anticipated to generate noise between 80-85 dBA.[120] Pile driving of the rack supports, or the helical pile equipment if the applicant decides to use helical piles, will be the most significant source of construction noises. Federal Highway Administration Construction guidance showed the noise from power hammers to be approximately 90 dBA at 50 feet. Factoring in sound dissipation over distance, calculated as a six decibel decrease for every doubling in distance[121], the noise from power hammers would be within NAC-1 compliant levels (Table 8) at 800 feet.[122]

Five of the fourteen local residences are within 650 feet of the project[123], with the closest residence (Residence #1, Figure 19) approximately 240 feet from the nearest solar array.[124] Thus, this construction noise would likely exceed state noise standards at select times and locations if it is continuous for at least six minutes. Exceedances would be short-term and confined to daytime hours. Even without an exceedance, noise impacts will occur.

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[118] SPA, p. 30.
[119] SPA, p. 26.
[120] SPA, p. 28, Table 4-3: Typical Sound Levels from Construction Equipment.
[121] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[122] SPA, p. 28.
[123] SPA, p.30, Table 4-4: Summary of Residences Within 0.25 Miles of the Site.
[124] SPA, p. 25.

Rhythmic pounding of foundations posts would be disruptive even if the noise associated with that activity is within state standards. If the applicant elects to install a helical pile based on conditions at the site, the installation would take longer but would be quieter.

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

Operation

Noise levels during operation of the project are anticipated to be negligible. The primary source of noise from the solar facility will be from inverters and transformers, typically characterized as a slight hum or buzz, although some minor noise may be generated from the short transmission line or from wind blowing through the conductors and structures. Panel trackers may produce limited noise as panels adjust throughout the day and reset to initial positions, but they are expected to be of such limited duration they do not affect compliance with noise standards.[125]

Noise levels are expected to be constant throughout the day and lower during non-daylight hours. The steady sound of facility operation will be limited by the NAC-1 L_{50} metric. Birch Coulee modeled expected operational noise level impacts to the nearest resident (Residence #1), approximately 240 feet from a solar array, to be approximately 36 dBA, well below the daytime L_{50} dBA noise standard of 60 dBA and the nighttime standard of 50 dBA.[126] Noise from routine maintenance activities is anticipated to be negligible to minimal. Noise from the electrical collection system is not expected to be perceptible.

MITIGATION

Sound control devices on vehicles and equipment (e.g., mufflers) conducting construction activities during daylight hours, and running vehicles and equipment only when necessary are common ways to mitigate noise impacts. Birch Coulee Solar also indicated that they may limit the duration of foundations installation in sections of the preliminary development area where the distance to the nearest residence is not far enough for sound to dissipate to NAC-1 compliant levels. Additionally, Birch Coulee Solar may elect to erect temporary mobile noise barriers adjacent to installations to reduce impacts.

Section 4.3.7 of the proposed DSP (**Appendix B**) is a standard condition that requires the permittee to comply with noise standards established under Minnesota noise standards as defined under Minnesota Rule, part 7030.010 to 7030.0080, and to limit construction and maintenance activities to daytime hours to the extent practicable.

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

No additional mitigation is proposed.

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[125] SPA, p. 29.
[126] EA, Appendix C, Question 15.

4.3.3 Cultural Values

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

Cultural values can be defined as shared community beliefs or attitudes that define what is collectively important to the group. These values provide a framework for individuals and community thought and action. Infrastructure projects believed inconsistent with these values can deteriorate community character. Those found consistent with these values can strengthen it. Projects often invoke varying reactions and can, at times, weaken community unity.

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

Cultural values can be informed by ethnic heritage. Residents of Renville County 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 seasonal/municipal events, and national holidays.

POTENTIAL IMPACTS

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

Renville County strives to preserve the small town, rural quality of life and maintain a strong agricultural base within the County.[127] The proposed project is immediately adjacent to and partially within the city of Franklin. The project's proximity to town may increase its visibility; some residents may see the conversion of the gently rolling agricultural fields north of Franklin to solar arrays as an encroachment on the small farm-town atmosphere of the city.

[127] Comprehensive Plan Task Force. *Renville County Comprehensive Plan.* (2002/2010). https://www.renvillecountymn.gov/government/comprehensive-plan/.

MITIGATION

In their site permit application, Birch Coulee Solar discussed fostering partnerships with the Renville County 4-H club, local Women's Civic Club, and Franklin Lion's Club for the upcoming year.[128] Partnerships such as these can help mitigate the project's unavoidable impacts to local cultural values. Section 5.3 of the DSP is a special condition that requires the permittee to continue community partnerships that provide resources to the Franklin area 4-H program, support local events, and assist community restoration projects throughout the project's lifespan. The permittee shall keep records of its community partnership efforts and provide them upon the request of Commission staff.

No additional mitigation is proposed.

4.3.4 Land Use and Zoning

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

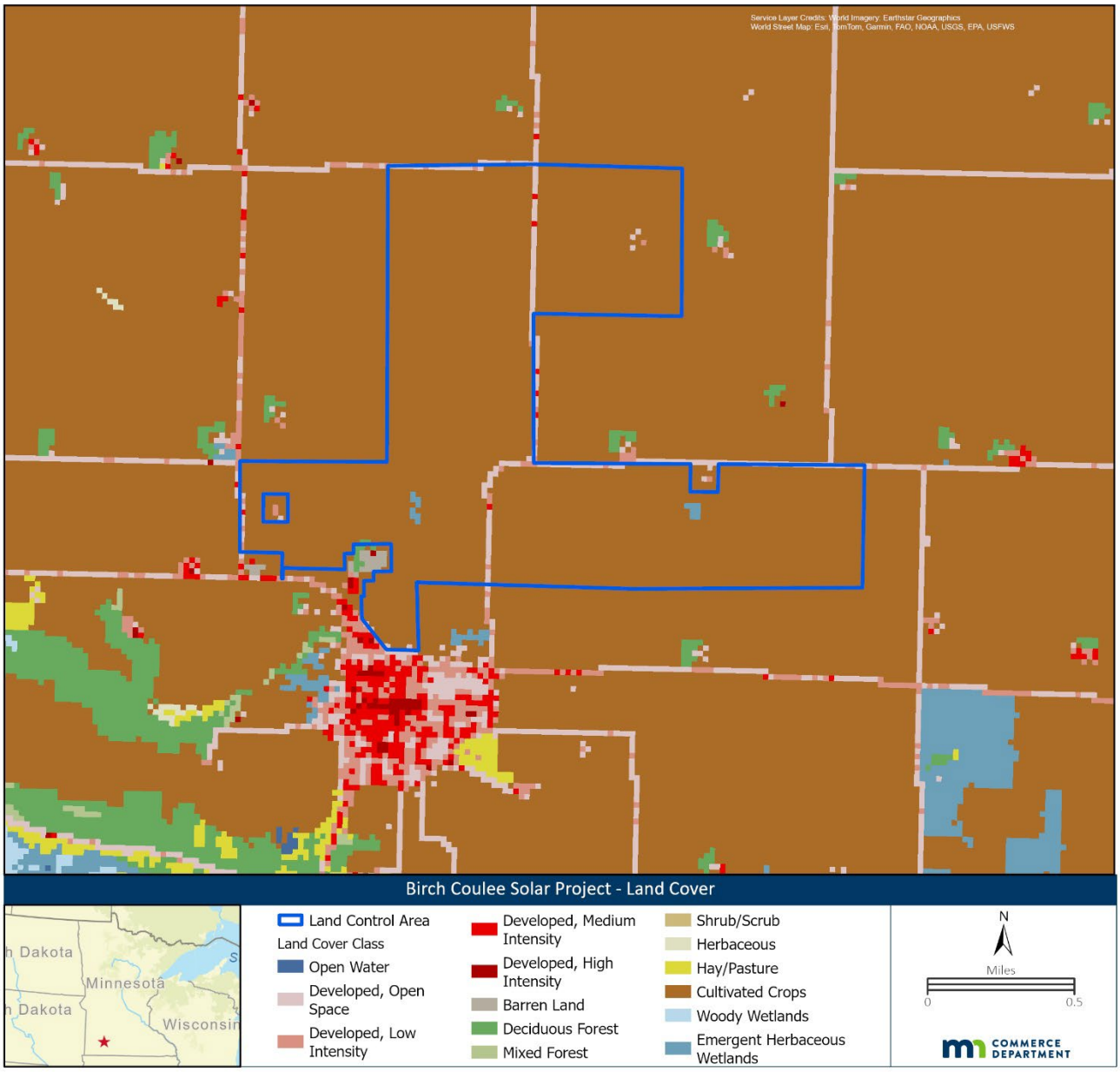
Land use is the characterization of land based on what can be built on it and how the land is used. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. Land cover documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types, including wetlands. Construction of solar generating facilities and transmission line will alter current and future land use and land cover. As shown in Table 9[129] and Figure 21, the project land cover is dominated by cultivated agriculture, with scattered areas of wetlands and developed areas around farmsteads.

Table 9. Land Cover

Category	Land Control Area (Acres)	Percentage
Developed, Open Space	29.7	2.85
Developed, Low Intensity	4.6	0.45
Developed, Medium Intensity	1.0	0.10
Barren Land	0.2	0.01
Emergent Herbaceous Wetlands	3.3	0.32
Deciduous Forest	0.2	0.02
Cultivated Crops	1,002.5	96.25
Total	**1,041.6**	100%

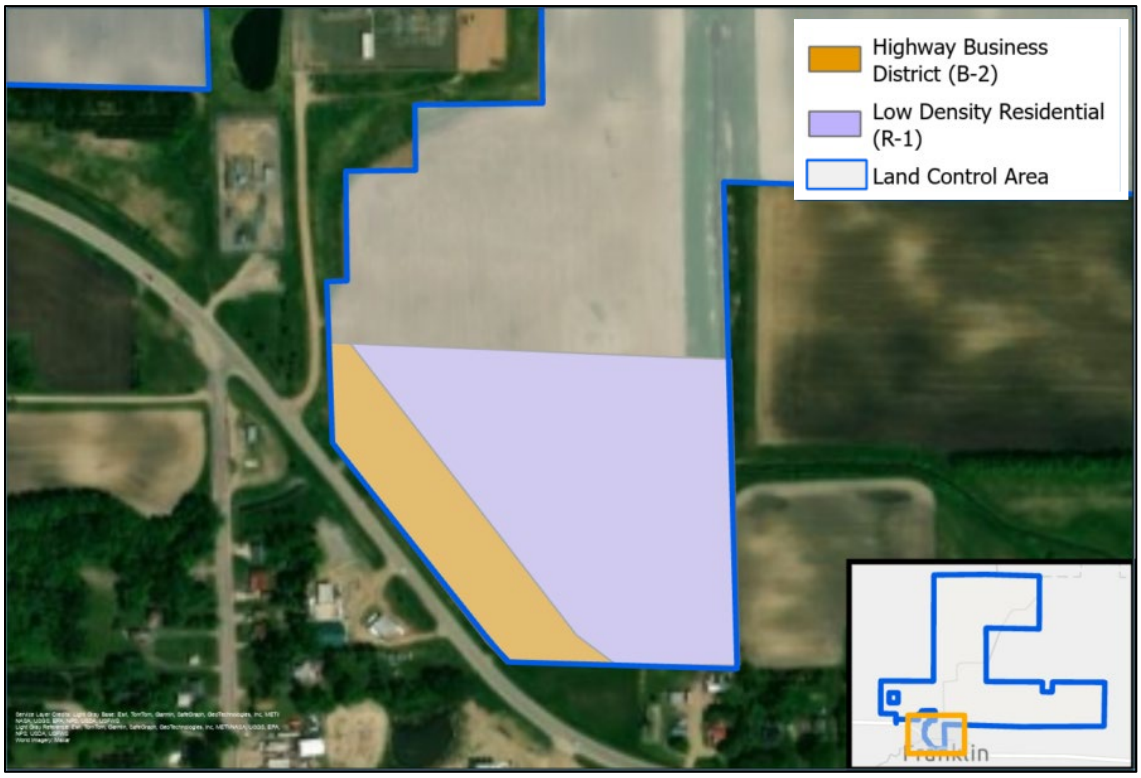
[128] SPA, p. 41.
[129] EA, Appendix C, Question 11.

Figure 21. Project Area Land Cover



A site permit from the Commission supersedes local zoning, building, or land use rules.[130] 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."[131] The area of land control is located within Birch Cooley, Bandon, and Camp Townships and the city of Franklin in Renville County. The majority of the solar facility is zoned agricultural; a small, southwestern section of the project that falls within the city of Franklin is zoned as highway business district or low density residential (Figure 22).[132]

Figure 22. Project Zoning



Solar energy farms over 100 kW in areas zoned agriculture require a conditional use permit from Renville County. Table 10 summarizes the performance standards for solar energy farms codified in Chapter 15 of the Renville

[130] Minnesota Statutes 216E.10, subd. 1.
[131] Minnesota Statutes 216E.03, subd. 7.
[132] City of Franklin Zoning Ordinance, Article I: Title, Application and Zoning Districts, retrieved from: https://franklinmn.us/ordinances/

County Land Use Ordinance[133] and Article III of the City of Franklin Zoning Ordinance.[134] Birch Cooley, Bandon, and Camp Townships do not have their own zoning regulations.

Table 10. Renville County and Franklin Performance Standards for Solar Farms

Standard	Renville County Renewable Energy Regulations
Height	35' at maximum tilt
Signs	In compliance with the requirements of Chapter 2, Part 3, Section 1.11
Location	Cannot be located in the: • Flood Plain Overlay District • Shoreland Overlay District • Scenic River Overlay District • Project River Bend Overlay District
Power & Communication Lines	Underground
Minimum Setbacks	• Dwelling Sites: 200 feet • Cemeteries: 200 feet • Road Right-of-Way: 67 feet • Drainage Ditch: 67 feet • County Tile Line: 40 feet from centerline • Side Yard Property Line: 20 feet • Rear Yard Property Line: 20 feet
Vegetative Screening	• Screening barriers between the project and adjacent residences and along roadways if the Planning Commission deems necessary • Perennial vegetation shall be established within 60 days of completion of the project • The solar company and property owner are responsible for maintenance • Noxious weeds are prohibited from growing on the property • The Planning Commission may create a condition specifying the type of vegetative cover to be used
Decommissioning	• Include the anticipated life of the project, the anticipated manner in which the facility is decommissioned and the site restored, estimated decommissions cost and site restoration including a method and schedule, and method of ensuring available funds • County Board may require the posting of a performance bond, letter of credit, cash deposit, or other security

[133] Renville County Land Use Ordinance, Chapter 15: Renewable Energy Regulations, retrieved from: https://www.renvillecountymn.gov/wp-content/uploads/2024/06/RenvilleCty_Ordinance-Chapter15-RenewableEnergyRegulations-Rev05252021.pdf

[134] City of Franklin Zoning Ordinance, Article III: General Regulations and Performance Standards, retrieved from: https://franklinmn.us/ordinances/

Standard	City of Franklin Zoning Ordinance
Height	36’ at maximum tilt
Placement	Must meet the accessory structure setback for the zoning district in which it is installed
Coverage	May not exceed the area restriction placed on accessory structures within the subject zoning district
Visibility	Screened from view to the extent possible without reducing their efficiency using walls, fences, or landscaping
Feeder Lines	Underground

Renville County’s Comprehensive Plan[135] sets forth the following project relevant goals for their agricultural districts:

- Prioritize the business of agriculture and agricultural-related industry (Commercial/Industrial Land Use Goal 1, Policy 1).
- Protect agricultural producers from development that results in the loss of farmland, land use conflicts, or complaints from neighbors (Agricultural Development/Farm Preservation and protection Goal 1, Policy 1).
- Promote development concepts to encourage the preservation of natural features and prime agricultural land (Agricultural Development/Farm Preservation and protection Goal 1, Policy 2).
- Protect the County’s agricultural natural resources (Preservation of Natural Resources, Goal 2).

Potential Impacts

Development of a solar farm in this area will temporarily change the land use from predominantly agricultural uses to energy generation for the life of the project, at least 30 years. The change of land use will have a minimal to moderate impact on the rural character of the surrounding area, and a minimal impact on the county character as a whole. Although the land is being converted from primarily agricultural to be used for energy production, the land use is consistent with other infrastructure in the area such as existing transmission lines and the adjacent substation.

The project is expected to be compatible with county planning goals and zoning ordinances. Birch Coulee Solar states that it will apply the structure setback to its facilities in a manner consistent with Renville County setback requirements. In addition, Birch Coulee Solar will continue to coordinate with the Franklin City Council to ensure that northward development of the city, future zoning, or land use will not be impacted by the project.

Individual perspective largely determine whether the project aligns with Renville County’s Comprehensive Plan. Individuals might believe the project is compatible with local planning goals because it furthers the county’s goals of preserving agricultural land and conserving natural resources in balance with agriculture and development.

[135] Comprehensive Plan Task Force. *Renville County Comprehensive Plan.* (2002/2010). https://www.renvillecountymn.gov/government/comprehensive-plan/.

However, the project will remove agricultural land from production, which could be interpreted as being incompatible with the county's planning goals.

After the project's useful life, the land control area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. The applicant has indicated that the project will be decommissioned such that agricultural activities can resume once decommissioning has been completed. Any project land temporarily leased from participating landowners will return to furthering the Renville County's goals of providing long-term agricultural opportunities once decommissioned.

MITIGATION

The project would convert approximately 768 acres of cultivated cropland to solar energy production. Although the project is subject to oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, Birch Coulee Solar will continue to coordinate with Renville County and the city of Franklin on other potential permits for the project. Many of the county and city ordinances have to do with the preservation of agricultural land.

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

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

The portion of the project that is within the city of Franklin will not limit the continued use of the surrounding area for agriculture, nor will it limit the use of the surrounding parcels. Impacts to county zoning can be mitigated by ensuring the project is consistent, to the greatest extent practicable, with Renville County's renewable energy regulations. The applicant states that the project is consistent with the Renville County zoning ordinances and comprehensive plan for development. Section 5.4 of the DSP is a special condition that requires the permittee adhere to all Renville County renewable energy setback requirements.

No additional mitigation is proposed.

4.3.5 Property Values

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

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

Because each landowner has a unique relationship and sense of value associated with their property, a landowner's assessment of potential impacts to their property's value is often a deeply personal comparison of the property "before" and "after" a proposed project is constructed. The landowner's judgments, however, do not necessarily influence the market value of a property. Professional property appraisers assess a property's value by looking at the property "after" a project is constructed. Moreover, potential market participants are likely to see the property independent of the changes brought about by a project; therefore, they do not take the "before" and "after" into account the same way a current landowner might. Staff acknowledges this section does not and cannot consider or address the fear and anxiety felt by landowners when facing the potential for negative impacts to their property's value.[136]

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

Large solar facilities exist in Minnesota; however, limited sales information is available. A review of the literature identified one peer-reviewed journal article that addressed impacts to property values based on proximity to utility-scale, PV solar facilities. The Lawrence Berkeley National Lab studied over 1,500 large-scale PV solar facilities in six states (including Minnesota) to determine whether home sale prices were influenced within 0.5 miles (from over 1.8 million home sale transactions).[137] In summary, the study found that effects, "on home sale prices depend on many factors that are not uniform across all solar developments or across all states."

In Minnesota in particular, the study found that homes within 0.5 miles of large-scale PV solar facilities had a 4 percent reduction in home sale prices compared to homes 2-4 miles away. This finding was considered statistically significant. Additionally, only large-scale PV solar facilities developed on previously agricultural land, near homes in rural areas, and larger facilities (roughly 12 acres or more) were found to be linked to adverse home sale price

[136] 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/.

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

impacts within 0.5 miles. The analysis did not include consideration of site features or site design, for example setbacks or landscaping features, which could play a role in nearby property valuation. Another limitation of the study was the lack of examination of the broader economic impacts or benefits to host communities from large-scale PV solar facilities, which might positively impact home sale prices.

Site-specific information should be considered when comparing the project to this study. The project will be over 12 acres on agricultural land in a rural area, making it relevant to the type of development that had statistically significant findings in the study. There are 14 residences within 0.25 miles of the preliminary development area of the project, e.g., where physical structures will be constructed. Without taking other factors into consideration, these properties could experience minimal to moderate property value impacts.

Considerations such as setbacks, benefits to the community, economic impact, and vegetative features could influence property values. For instance, project facilities are expected to comply with Renville County Zoning Ordinance setbacks. Additionally, several of the potentially affected properties have vegetative screening. All 14 residences within 0.25 miles of the preliminary development area have some level of vegetative screening present on their property. However, it is anticipated that solar arrays will be visible to some extent at 13 out of the 14 residences.[138] Birch Coulee Solar indicates that they will consult with adjacent landowners on the use of vegetative screening for the project.

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.[139] 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.[140] Similar studies outside of Minnesota found that proximity to a solar farm leads to a depreciation of 1.7-5.4% in property values.[141,142]

Potential Impacts

Impacts to the value of specific properties within the project vicinity are difficult to determine but could occur. Because of this uncertainty, impacts to specific properties could be minimal to moderate, but are expected to be within 0.5 miles of the project and to decrease with distance from the project and with time. The study-specific analysis of the area determined that 13 residences are most likely to have increased potential impacts on their property values.

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[138] SPA, p. 30, Table 4-4: Summary of Residences Within 0.25 Miles of the Site.

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

[140] 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 \

[141] Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island, September 2020. Retrieved from: https://www.uri.edu/news/wp-content/uploads/news/sites/16/2020/09/PropertyValueImpactsOfSolar.pdf

[142] The Disamenity Impact of Solar Farms: A Hedonic Analysis, February 2023. Retrieved from: https://le.uwpress.org/content/99/1/1

Based on analysis of other utility-scale solar projects, significant negative impacts to property values in the project vicinity are not anticipated. 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.

Neighbors in proximity to the proposed project voiced concerns over perceived difficulties in selling their homes at the scoping meeting. One home, in close proximity to the project, saw only 2 viewings over several months and received no offers in that time.[143] The home, which was listed for $365,000 in mid-May, 2024, sold for $250,000 in mid-December 2024.[144] The house, which sold at approximately 31% below asking price, was on the market for 213 days, approximately twice the average time to sell in Minnesota.[145] It is impossible to determine whether the proximity to the proposed project impacted the length of time the house was on the market or the selling price. There is relatively limited housing in the region, which makes it difficult to compare the homeowner's experience to similar homes in the area. Homes selling below the listed values is not uncommon, roughly 20% of homes sold in Minnesota during the month of December 2024 were sold at a price drop.[146] However, some residents in the area feel that the proposed project did impact their neighbor's ability to sell their home and have concerns about the effect the project on their property values.

MITIGATION

Impacts to property values can be mitigated by reducing aesthetic impacts and impacts to future land use. Impacts can also be mitigated through individual agreements with neighboring landowners; impacts can be mitigated through a vegetation screening plan or complying with the vegetative screening requests of Renville County.[147] Agreements with individual landowners are not within the scope of this EA.

4.3.6 Tourism and Recreation

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

In 2022, the leisure and hospitality industry in Renville County accounted for about $11,545,796 in gross sales, and 228 private sector jobs.[148] Recreation and tourism in the project area are largely related to activities including hunting, fishing, canoeing and kayaking, and snowmobiling. Activities in the project area are associated with wildlife management areas (WMAs), snowmobile trails, and the Minnesota River. The Franklin Softball Field and

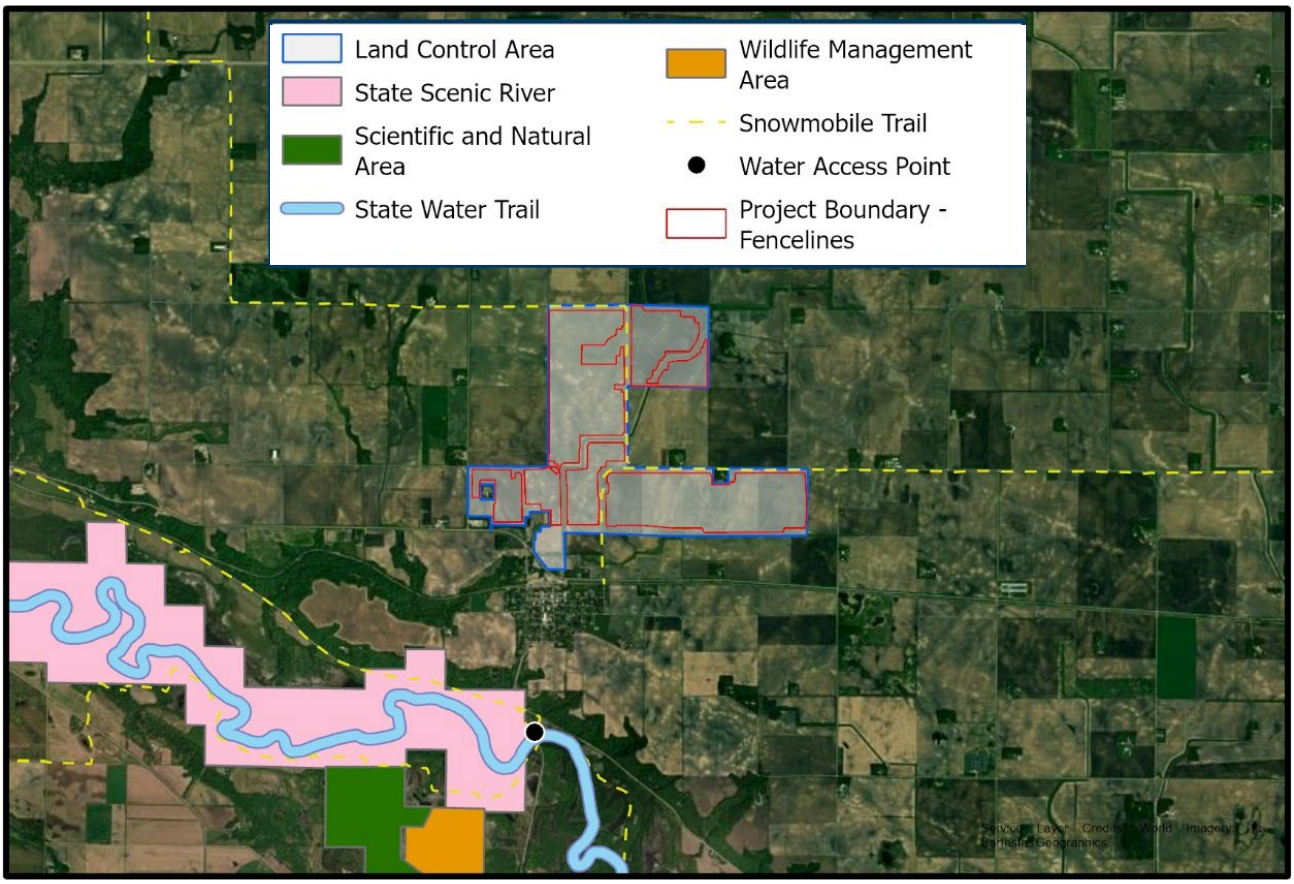
[143] Oral Comments on the Scope of Environmental Assessment, Public Scoping and Information Meetings, Franklin, Minnesota, October 9th, 2024 and virtual meeting, October 10th, 2024, eDocket ID: 202411-212174-01, p. 21.
[144] Zestimate History, Zillow (2025). Retrieved from: https://www.zillow.com/homedetails/40565-660th-Ave-Franklin-MN-55333/106824526_zpid/
[145] Realtor.com. "Realtor.com Housing Data." (December 1, 2024). Retrieved from: https://www.realtor.com/research/data/
[146] Redfin. "Redfin Housing Data." (December 2024). Retrieved from: https://www.redfin.com/state/Minnesota/housing-market
[147] Written Comments on the Scope of Environmental Assessment, p. 5, eDocket ID: 202411-211553-01
[148] 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

picnic pavilion is immediately south of the project across TH 19.[149] The city of Franklin, Minnesota's Catfish Capital, hosts the annual Catfish Derby Days the 4th weekend in July.[150]

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

The Franklin Public Water Access Site which allows recreational access to the Minnesota River, Cedar Mountain Wildlife Management Area, and Cedar Mountain Scientific Natural Area are all within 1.5 miles of the project. The Morton to Cambria section of the Minnesota River State Water Trail starts at the Franklin City Park and runs to the Mack Lake Park. There is one state snowmobile trail that runs within the project area that is adjacent and parallel to 670th Avenue, 400th Street, and 660th Avenue. The trail is maintained by the Renville County Drift Runners. Figure 23 shows the location of recreational opportunities within the project area.

Figure 23. Project Area Recreation and Tourism



[149] SPA, pp. 41-42.
[150] SPA, p. 41.

Potential Impacts

Impacts to tourism and recreation are anticipated to be minimal and temporary. Due to construction, there will be short-term increases in traffic and noise that could potentially impact recreational activities in close proximity to the project area. However, impacts will be temporary. The snowmobile trail is within the land control area but, as shown in Figure 23, runs outside of the preliminary development area and therefore outside of the fence line. Consultation with the Renville County Drift Runners over the snowmobile trail conformed no adverse effect of the project on trail access, and the snowmobile club does not anticipate any issues.[151] No significant long-term impacts to recreational activities are anticipated.

Mitigation

Traffic management is addressed in special condition Section 5.5 of the DSP; the developed control plan will mitigate potential traffic impacts during local events, such as Franklin's Catfish Derby Days, which will coincide with construction season.

No additional mitigation measures are proposed.

4.3.7 Transportation and Public Services

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

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

Water and Wastewater

Most residents in the surrounding rural area have private septic systems and or/drain fields and water supply wells, however, the city of Franklin offers municipal water and sewer services to residents within the municipality. The Minnesota Well Index (MWI) identified no wells within the land control area.[152]

Electric Utilities

The primary electric provider in the project area is Xcel Energy, which provides electricity in Renville County. Xcel Energy owns the existing 115 kV transmission line within the project area and west of the proposed project substation (Figure 15). In addition to the high voltage transmission lines, there are lower voltage electric distribution lines throughout the project area.

Pipelines

There are no known pipelines within the land control area or in the surrounding 1-mile project area radius.

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[151] SPA, p. 42.

[152] Minnesota Department of Health. *Minnesota Well Index.* [Online] [Cited: January 9, 2025]. Retrieved from: https://mnwellindex.web.health.state.mn.us/

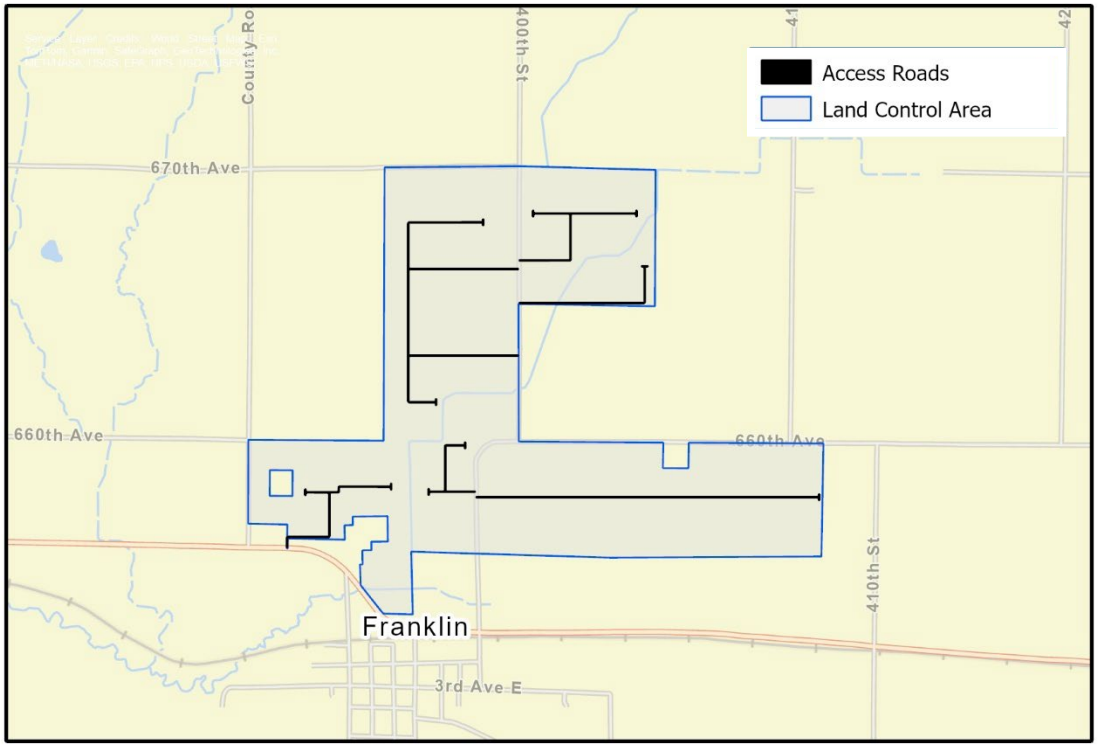
Roads

The major roadways adjacent to or bisecting the project are CR 73/400th Street, which runs north-south through the center of the land control area. Along a portion of the northernmost border of the project is 670th Avenue, a township road that runs east-west. Along the westernmost portion of the project is CSAH 5, which runs north-south. A township road, 660th Avenue, runs east-west along a portion of the southern third of the project and TH 19 runs east-west immediately south of the project. Table 11 summarizes the Average Annual Daily Traffic (AADT) counts for roads within or adjacent to the project.[153] Traffic counts are not available for township roads. Birch Coulee Solar plans to access the project from CR 73/400th Street and TH 19 (Figure 24), with the possibility of minor field access.

Table 11. Average Annual Daily Traffic Within or Adjacent to the Project Area

Roadway	Year	AADT Traffic Volume Total
CR 73/400th Street	2011	60
CSAH 5	2019	650
TH 19	2023	2651

Figure 24. Project Access Roads



[153] Minnesota Department of Transportation. *Traffic Mapping Application*. [Online] [Cited: January 9, 2025.] Retrieved from: https://mndot.maps.arcgis.com/apps/webappviewer/index.html?id=7b3be07daed84e7fa170a91059ce63bb

Railroads

There are no railroads located within the land control area, however, a Minnesota Prairie Line runs east-west through the city of Franklin directly south of the project. Twin City & Western Railroad, the parent railroad of Minnesota Prairie Line, Inc., owns and operates this railroad.[154]

Airports

There are no Federal Aviation Administration (FAA) registered airports located in the project area, or within 5 miles of the project. The nearest FAA-registered airport is the Redwood Falls Municipal Airport, located 10.9 miles west of the project. There are no private airstrips located in the project area, or within 5 miles of the project.

In order to assure safety, both the FAA and MnDOT Office of Aeronautics have established guidelines for the location of structures near airports. The FAA has height restrictions for development near public airports and guidelines for placement of buildings and other structures near high frequency omnidirectional range navigation systems. MnDOT has zoning areas around public airports that restrict the area where buildings and other structures can be placed.

Housing

There are close to one thousand vacant housing units in Renville County, but available housing in proximity to the project is much more limited. The city of Franklin, which is the closest location to the proposed project, has only 5 available housing units, while available housing in the surrounding townships ranges from 5 to 10 units.

Table 12. Housing Characteristics*

Area	Total Housing Units	Total Occupied Housing Units	Total Vacant Housing Units
Minnesota	2,485,558	2,344,432	141,126
Renville County	6,913	6,513	760
Franklin City	206	201	5
Bandon Township	71	63	8
Birch Cooley Township	94	89	5
Camp Township	83	73	10

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

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

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

Birch Coulee Solar does not anticipate impacts to water and wastewater systems, as there are no wells located within the land control area. If the O&M building will be on site, a single domestic-sized water well will likely be required to provide potable water for drinking and sanitary services for three full time operation employees. If a domestic water well is needed, a well construction permit will be required from the Minnesota Department of Health (MDH).

Roads

During construction, workers and trucks delivering construction material and equipment will use the existing state, county, and township road system to access the project. Traffic during construction is estimated to be approximately 20 – 100 pickup trucks, cars, and/or other types of employee vehicles on site during active construction (12-18 months). Approximately 10 – 20 semi-trucks per day will be used for delivery of facility components.

Construction traffic will be perceptible to area residents, particularly those residing within and around the city of Franklin, as TH 19 directly borders both Franklin and the project. However, because the average daily traffic within the area is well below the design capacity of a rural two-lane highway,[155] 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. Overweight or oversized loads are not anticipated except for delivery of the generator step-up transformer, and appropriate approvals will be obtained as necessary.[156] Birch Coulee Solar will minimize the movement of construction equipment on or across roads and conduct all movement in accordance with MnDOT requirements.

Birch Coulee Solar will construct facilities within the limits of the preliminary development area. Localized, temporary road closures may be necessary for one day during the delivery of the generator step-up transformer.[157] Birch Coulee Solar will closely coordinate construction activities with City, County, and Township staff if any closures are determined necessary. With the possible exception of minor field access or driveway changes depending on final design, no changes to existing roadways are anticipated. No impacts to roads are anticipated during the operation; negligible traffic increases would occur for maintenance.

The use of TH 19 to access the project has additional public safety impacts and vegetation management impacts which are discussed, along with mitigations, in Sections 4.4.2 and 4.7.6, respectively.

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

[156] SPA, p. 6, Table 2-1: Additional Potential Permits, Reviews, and Consultations.

[157] SPA, p. 48.

Railroads

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

Electric Utilities

No long-term impacts to utilities will occur because of the project. The project will not impact existing overhead transmission lines, although Birch Coulee Solar indicates that there may be limited, temporary impacts to electrical service during interconnection. These impacts are expected to be short-term, and Birch Coulee Solar indicates that coordination with local individuals and utilities impacted would take place prior to shutdowns.[158]

Pipelines

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

Air Safety

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

Housing

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

MITIGATION

Water and Wastewater

Birch Coulee Solar indicates that final project design will avoid impacts to underground and overhead utilities, and underground utilities will be marked prior to construction start. A well construction permit from the Minnesota Department of Health (MDH) would be required if a well is installed at the O&M building (if on site) in the future.

Utilities

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

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

[158] SPA, p. 43.

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

Roads

Changes or additions to driveways from county roads will require coordination with local authorities and permits from Renville County.

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

The DSP (**Appendix B**) proposes special conditions related to traffic control and road usage:

- Section 5.5 requires the permittee to develop a traffic control plan with the appropriate road jurisdictional authorities that will be implemented for local events and temporary road closures.
- Section 5.6 requires the permittee to enter into a Road Use and Development Agreement with Renville County and affected Townships. The permittee shall keep records of its Road Use and Development Agreement and provide them upon request of Commission staff.

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

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

Pipelines

No active pipelines are near the project area; therefore, no mitigation is required.

Railroads

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

Air Safety

The current project plan generated a “no notice required” from the FAA’s Notice Criteria Tool for all components of the project; therefore, no mitigation is required. Birch Coulee Solar indicates that, although unlikely, if a crane

higher than 150 feet will be required that will necessitate filing with the FAA, they will make the requisite filing and follow appropriate protocol.[159]

Housing

Birch Coulee Solar is aware of the limited housing availability in the project area. They have indicated that temporary construction workers will likely be housed in nearby hotels in the city of Morton or on the Lower Sioux Indian Community Reservation, rather than local vacant housing units. This will maintain housing availability for other individuals who may relocate to the area. No impacts to local housing availability are anticipated, therefore no mitigation is required.[160]

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.

Renville County is growing slower than Minnesota as a whole; between 2010 and 2020, the population in Renville County decreased by 6.4 percent, compared to a growth of 7.6 percent for Minnesota overall. From 2010 to 2020 the population of Bandon Township decreased by 24.6 percent, the population of Birch Cooley Township decreased by 6.5 percent, and the population of Camp Township decreased by 13.4 percent. The population of the city of Franklin decreased by 3.3 percent over the same time period. Renville County, Birch Cooley, Bandon, and Camp Townships, and the city of Franklin all have a lower minority population compared to the State. Renville County, Camp Township, and the city of Franklin have lower median household incomes compared to the State, however Birch Cooley and Bandon Townships have a higher median household income compared to the State. (Table 13).

Renville County is part of the Minnesota Department of Economic Development (MDEED) Region 6E, which is located in the Southwest Central Planning Region. In 2023, the sectors with the largest employment in Renville County were educational services and healthcare (24.6 percent), manufacturing (16.5 percent) and agriculture and other natural resources (12.4 percent).[161] In 2023, Renville County had a slightly higher unemployment rate (3.7%) than the state average (2.8%). The county also had a lower labor force participation rate (63.0) than Minnesota as a whole (68.7) and is projected to see a continued labor force decline from 2025 to 2035.[162]

[159] SPA, p. 48.
[160] SPA, p. 39.
[161] American Community Survey, 2023
[162] Minnesota Department of Economic Employment and Development (DEED). *Economic Development Region Profile, Renville County 2023 Regional Profile*. (2023), https://mn.gov/deed/assets/101824_renville_tcm1045-407420.pdf

Table 13. Population Characteristics

Area	Total Population				Population Characteristics		
	2010 Census*	2020 Census*	% Change 2010 - 2020	2023 Estimate **	% Minority‡	Median Household Income ($)º	% Below Poverty Levelº
Minnesota	5,303,925	5,706,494	+7.6	5,800,386	23.3º	85,086	9.3
Renville County	15,730	14,723	-6.4	14,348	12.5º	69,086	10.7
Franklin City	510	493	-3.3	512	19.3º	54,904	15.1
Bandon Township	175	132	-24.6	137	3.2°	107,500	3.2
Birch Cooley Township	245	229	-6.5	213	14°	89,464	16.9
Camp Township	186	161	-13.4	142	14.3°	81,250	14.4

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

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

° 2020 American Community Survey 5-year estimates

º 2023 American Community Survey 5-year estimates

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

Potential Impacts

The impact intensity level is anticipated to be positive. Potential impacts associated with construction will be positive, but minimal and short-term. Significant positive effects might occur for individuals. Impacts from operation will be long-term, positive, and moderate. The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority populations (see discussion of environmental justice in Section 4.3.9). Adverse impacts are not anticipated.

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

Employment and Wages

The applicant anticipates supporting up to 300 temporary construction and installation jobs for this project, following the prevailing wage and apprenticeship rules in place under the United States Inflation Reduction Act, a federal public law signed in 2022. The Inflation Reduction Act offers enhanced tax benefits for a range of clean energy projects. Taxpayers that wish to take advantage of an enhanced clean energy tax benefits must ensure that all laborers and mechanics are paid the applicable prevailing wage, including fringe benefits, for all hours

performing construction or repair, and must employ apprentices from registered programs for a certain number of hours.[163]

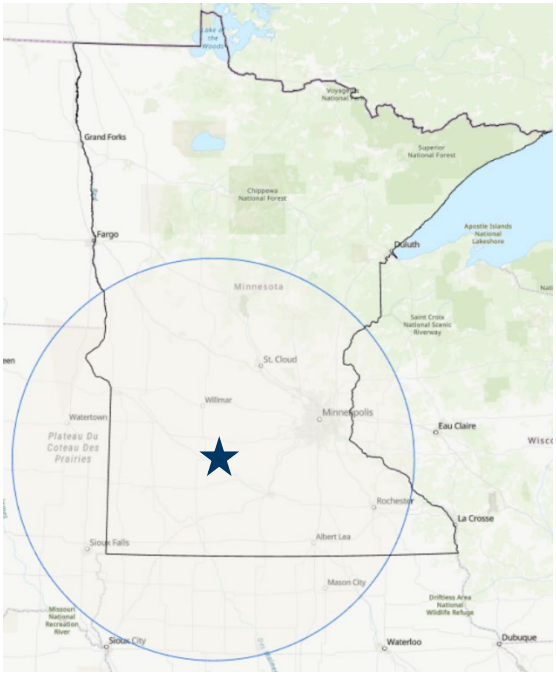
The applicant anticipates the project will require up to 300 jobs during the construction and installation phases, and 3 long-term personnel during the operations phase. Birch Coulee Solar aims to utilize skilled local labor from qualified candidates in the surrounding communities to the extent possible,[164] but because experience requirements vary widely it is difficult to predict how many jobs may or may not be considered local.[165] Additionally, Birch Coulee Solar indicates they are currently considering the use of union labor and will determine employment closer to construction.

Minnesota's Renewable Energy Objectives[166] and Renewable Energy Initiatives[167] establish several Commission priorities relating to renewable energy project construction including:

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

The location of the proposed project gives Birch Coulee Solar the potential to meet Commission priorities by providing significant socioeconomic benefits to local, union construction workers. "Local workers" are defined as Minnesota residents and/or permanent residents who live within 150 miles of a proposed energy facility.[168] Figure 25 presents a 150 mile "local worker" radius from the proposed project location, which would be accessible to workers living in Western, Central, and Southern Minnesota. Project construction will result in indirect, local economic benefits from additional spending on lodging, goods and services and local sales tax.[169] These benefits are anticipated to be greater if the construction workforce is largely composed of local labor versus non-local labor. Local workers are found to generate approximately three times more local economic

Figure 25. Project "Local Worker" Radius



[163] U.S. Department of Labor, *Prevailing Wage and the Inflation Reduction Act*. https://www.dol.gov/agencies/whd/IRA
[164] SPA, p. 39.
[165] "Local workers" as defined in Minnesota Statute 216B.2422, Subd. 1.
[166] Minnesota Statute 216B.1691, Subd. 9.
[167] Minnesota Statute 216B.2422.
[168] Minnesota Statute 216B.2422, Subd. 1.
[169] SPA, p. 39.

activity through spending than a non-local worker at the individual level,[170,171] and a largely local workforce generates double the economic impact of a largely non-local workforce.[172]

The use of local workers who reside in Renville County could have significant positive impacts, not only through providing employment, but by developing employment opportunities, offering living wage jobs that attract young people and support families, and providing experience for the local labor force tailored to industry needs.[173] Employment in the renewable energy sector provides workers the opportunity to develop the required technical skills to work in the green economy,[174] which can increase opportunities for future employment. Minnesota is anticipated to continue to expand renewable energy development in the coming years,[175] and the state's investments in the development and incentivization of clean energy[176] will enable future renewable projects. Birch Coulee Solar's use of local labor would provide Minnesota workers with the relevant skills for the growing renewable industry, preparing them for future employment opportunities.

Taxes

Once the project is operational, Birch Coulee Solar will pay property tax and production taxes on the land and energy production to local governments. Property taxes are calculated on the land underlying the facility. Because the land for the solar generating facility is used primarily for solar generation, the land is classified as Class 3a (commercial/industrial/public utility) which is taxed at a higher rate than land used primarily for homestead or agriculture. The value of the generation equipment is exempted from the property tax.[177]

Minnesota has adopted a production tax of $1.20/MWh paid 80 percent to counties and 20 percent to the cities and townships.[178] Birch Coulee Solar estimates an average annual solar energy production and property tax revenue over the life of the project of approximately $350,000 for Renville County and approximately $175,000 in

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

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

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

[173] Comprehensive Plan Task Force. Renville County Comprehensive Plan. (2002/2010). https://www.renvillecountymn.gov/government/comprehensive-plan/.

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

[175] 2024 Minnesota Energy Factsheet, retrieved from: https://www.cleanenergyeconomymn.org/wp-content/uploads/2024/04/2024-Minnesota-Energy-Factsheet.pdf

[176] H.F. 5247

[177] 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 .

[178] *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

local jurisdictional revenue.[179] Each jurisdiction will receive an amount of production tax revenue proportional to the respective acreage within the project.[180]

Agricultural Businesses

If the project is constructed, approximately 768.2 acres will be removed from agricultural production that are 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 0.1 percent of the approximately 626,065 acres of farmland in Renville County is unlikely to have a significant impact.[181] Adverse impacts associated with the loss of agricultural land and agricultural production will be mitigated through lease payments to landowners.

Financial Assurances

Birch Coulee Solar anticipates providing financial assurance for decommissioning in the form of self-bond, surety bond, a federally insured certificate of deposit, government-backed securities, corporate guarantee, letter of credit, or cash. The financial assurance will begin in the tenth year after construction is initiated. The financial assurance will be posted in quarters in years 10, 15, 20, and 25.[182]

Renville County has indicated that Birch Coulee Solar's current decommissioning financial assurance plan is not sufficient for a project of this size. Representatives from the County raised concerns over the cost of decommissioning, which they estimated to be $13,405,430.00, becoming a financial burden to county residents should decommissioning the project become the responsibility of the county. Renville County requested that Birch Coulee Solar provide full decommissioning financial assurance, a minimum of $13,500,000.00, starting at year one and that Birch Coulee Solar submit a copy of this financial assurance to Renville County upon issue.[183]

MITIGATION

Socioeconomic impacts are anticipated to be positive. Section 8.5 of the DSP requires quarterly reports concerning efforts to hire Minnesota workers. Consistent with Minn. Stat. 216E.03, subd. 10 (c). Section 8.6 requires the permittee, as well as its construction contractors and subcontractors, to pay no less than the prevailing wage rate.

Birch Coulee Solar's draft decommissioning plan is consistent with Commerce application guidance[184] and with current Commission practice. Enforcing additional conditions relating to decommissioning financial assurance is beyond the purview of this EA. However, the concerns raised by Renville County relating to decommissioning financial assurance are noteworthy, as thus far the County has not seen large-scale solar development.

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[179] SPA, p. 39
[180] EA, Appendix C, Question 14.
[181] USDA, Census of Agriculture County Profile, Renville County Minnesota (2022). https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27129.pdf.
[182] SPA, Appendix G: Decommissioning Plan, p. 8.
[183] Written Comments on the Scope of Environmental Assessment, eDocket ID: 202411-211553-01, pp. 4-5.
[184] DOC EERA. *Application Guidance for Site Permitting of Solar Farms*. (January 2024). Retrieved from: https://apps.commerce.state.mn.us/web/project-file/12694

The DSP (**Appendix B**) proposes special conditions related to decommissioning and project ownership:

- Section 5.7 requires the permittee to coordinate with Renville County to develop a mutually agreeable project decommissioning plan consistent with Section 9.1 of the permit.
- Section 5.8 requires the permittee to notify Renville County officials if there is an ownership change pursuant to Section 2.1 of the permit and provide the new contact information.

No additional mitigation is proposed.

4.3.9 Environmental Justice

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

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."[185] 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.[186]

POTENTIAL IMPACTS

Utility infrastructure can adversely impact low-income, minority or tribal populations. Minnesota Statute 216B.1691, subd. 1 (e)[187] defines an environmental justice area as a census tract that contains:

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

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

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.[188] 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

[185] US EPA Environmental Justice, https://www.epa.gov/environmentaljustice .
[186] US EPA, Guidance for Incorporating Environmental Justice Concern in EPA's NEPA Compliance Analyses (pdf),
[187] Minnesota Statute 216B.1691, subd. 1 (e).
[188] US EPA EJ Screen, https://www.epa.gov/ejscreen..

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 14 provides low-income and minority population data and Figure 26 shows the census tract used to compare the project area with Renville County. The proposed project is not within the exterior boundaries of a federally recognized tribal reservation or community.

Figure 26. Census Tracts in Project Area*

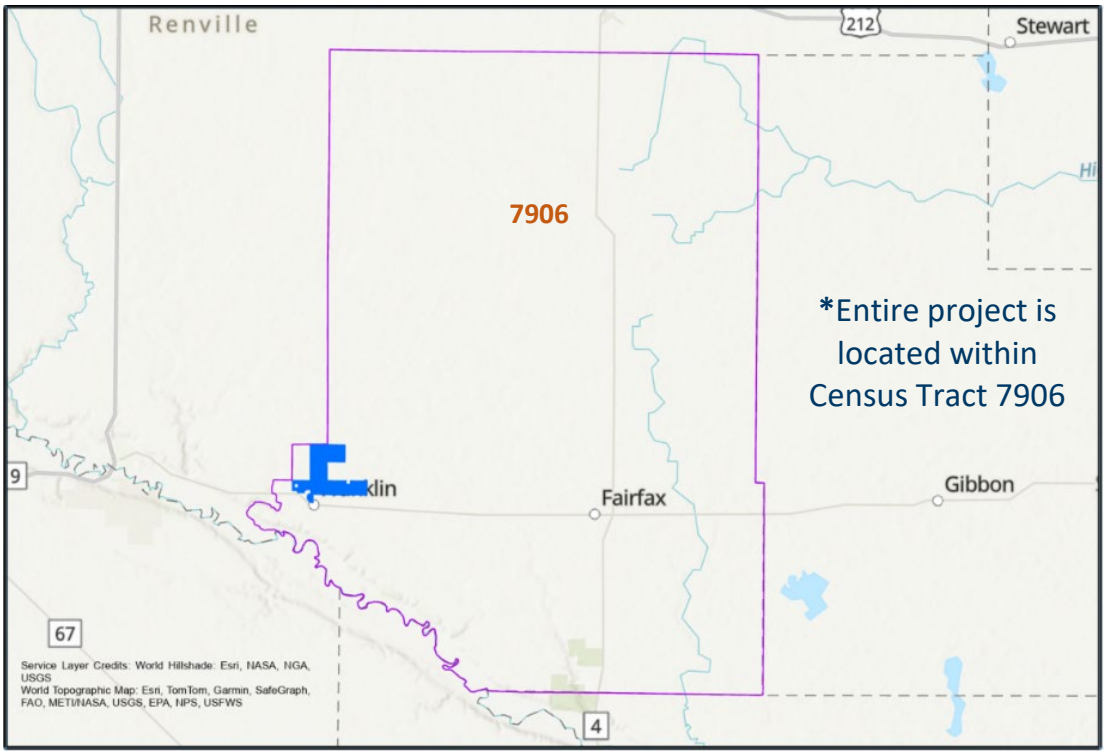

Table 14. Low-Income and Minority Population Characteristics

Area	% Income ≤ 200% of Poverty Level	% limited English proficiency	% Minority Population‡
Area			
Minnesota	22.0	2.3	23.3
Renville County	29.08	0.6	12.5
Project Census Tract			
Census Tract 7906	34.33	0.7	18.2

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

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

None of the percentages for census tract 7906 exceed 50 percent of the Renville County percentage by 10 percentage points or more, which is the defined threshold of significance for potential environmental justice impacts from the project.

MITIGATION

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

4.4 Human Health and Safety

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

4.4.1 Electronic and Magnetic Fields

The ROI for EMF is the land control area. 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 15 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."[189]

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

Table 15. Electric and Magnetic Field Strength of Common Household Objects[190]

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."[191]

Ever since, researchers have examined possible links between ELF-EMF exposure and health effects through epidemiological, animal, clinical, and cellular studies. To date, "no mechanism by which ELF-EMFs or radiofrequency radiation could cause cancer has been identified. Unlike high-energy (ionizing) radiation, EMFs in the non-ionizing part of the electromagnetic spectrum cannot damage DNA or cells directly," that is, the ELF-EMF that is emitted from HVTLs does not have the energy to ionize molecules or to heat them.[192] Nevertheless, they are fields of energy and thus have the potential to produce effects.

[190] 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

[191] 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

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

> "The few studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer."[193]
>
> "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."[194]
>
> "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."[195]

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.[196]"

Regulations and Guidelines Currently, there are no federal regulations regarding allowable ELF-EMF produced by power lines in the United States; however, state governments have developed state-specific regulations. For example, Florida limits electric fields to 2.0 kV/m and magnetic fields to 150 mG at the edge of the ROW for 161

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

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

[195] 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.

[196] Id., page 36.

kV transmission lines.[197] Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (Table 16).

Table 16. International Electric and Magnetic Field Guidelines

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

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

The Commission limits the maximum electric field under high voltage transmission lines in Minnesota to 8.0 kV/m.[198] It has not adopted a standard for magnetic fields.

Potential Impacts

Potential impacts are anticipated to be negligible and are not expected to negatively affect human health. Impacts will be long-term and localized but can be minimized. The primary sources of EMF from the generating facility will be from the solar arrays, buried electrical collection lines, and the transformers installed at each inverter.

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.[199] For electrical collection lines, a study found that at 27.5 kV that magnetic fields are within background levels at 1 meter above ground.[200] The project includes a 115 kV overhead gen-tie line; underneath a 115 kV overhead transmission line, the typical electric field levels are 1.0 kV/m, which dissipates to 0.5 kV/m at 50 feet, and the typical magnetic field levels are 29.7 mG, before dissipating to 6.5 mG at 50 feet.[201]

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[197] 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.

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

[199] 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

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

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

MITIGATION

No health impacts from EMF are anticipated. EMF diminishes with distance from a conductor or inverter. The nearest solar array is located approximately 240 feet from the nearest residence, with the nearest inverter being even further away, and the gen-tie line is 1,950 feet from the nearest residence.[202] At this distance both electric and magnetic fields will dissipate to background levels. No additional mitigation is proposed.

4.4.2 Public Safety and Emergency Services

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

Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. During operation there are occupational risks similar to those associated with construction. Public risks would result from unauthorized entry into the facility.

Construction crews must comply with local, state, and federal regulations when installing the project. This includes standard construction-related health and safety practices. This generally includes safety orientation and training, as well as daily/weekly safety meetings. The project will be designed and constructed in compliance with applicable electric codes. Electrical inspections will ensure proper installation of all components, and the project will undergo routine inspection. Electrical work will be completed by trained technicians. Fencing will deter public access, and signage will provide appropriate public warnings.

Emergency services in the project area are provided by local law enforcement and emergency response agencies located in nearby communities. Law enforcement in the project area is provided by the Renville County Sheriff. Fire service is provided by the Franklin Fire & Rescue. The nearest urgent care facility is the CentraCare Redwood Hospital in Redwood, approximately 12.5 miles west of the project.

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. Only one temporary road closure is anticipated during construction, during the delivery of the generator step-up transformer,[203] but any temporary closures could impede police, fire, and other rescue vehicles access to the site of an emergency.

[202] SPA, p. 25.
[203] SPA, p. 48.

In Minnesota, unless solar panels discarded by commercial entities are specifically evaluated as non-hazardous, the panels are assumed to be hazardous waste due to the probable presence of heavy metals. Heavy metals in solar panels can include arsenic, cadmium, lead, and selenium. If hazardous waste, they must be properly disposed of in a special facility or recycled if recyclers are available.[204]

Several specific public safety concerns were raised during scoping, each is individually addressed below.

Fire Risk and Emergency Services

Like any electrical system, solar panels do represent a potential fire risk. Research on fire risk in PV systems indicates that electrical arcing is a main cause of fires, arising due to the use of faulty products, installation errors, or irregular maintenance failing to identify issues with system components.[205] Research investigating the causes of fire in PV systems has mainly focused on rooftop installations; considering that ground-mounted PV systems contain similar electrical components as rooftop systems, they likely experience similar fire causes as well.

The preliminary development area will contain native vegetation, which could increase the fire hazard if improperly managed. Due to the proximity of the project to the Franklin 115 kV Substation and the city of Franklin, an uncontrolled fire within the site could become a threat to public safety. Franklin Fire & Rescue would be the initial responder to fires on site, as a small-town fire department they may lack experience managing fires in large-scale electrical utilities.

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

TH 19: Access Roads

Birch Coulee Solar currently plans to install one project access road on TH 19 for the southwestern portion of the site. Additionally, Birch Coulee Solar anticipates using the existing Franklin 115 kV Substation road as the access point for the largest proposed temporary laydown area during construction. Project access points along TH 19 pose a human safety concern.[206] MNDOT has identified access management a legitimate public safety issue, noting that there is a direct connection between vehicle crash rates and access point density on state trunk highways.[207] The access points along TH 19 would see a significant volume of project-related traffic, some of which will be oversized and/or slow-moving loads. This segment of road experiences high-speed traffic, and the curvature of the road, skewed access, and sightlines could create a significant collision risk.

TH 19: Living Snow Fence

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

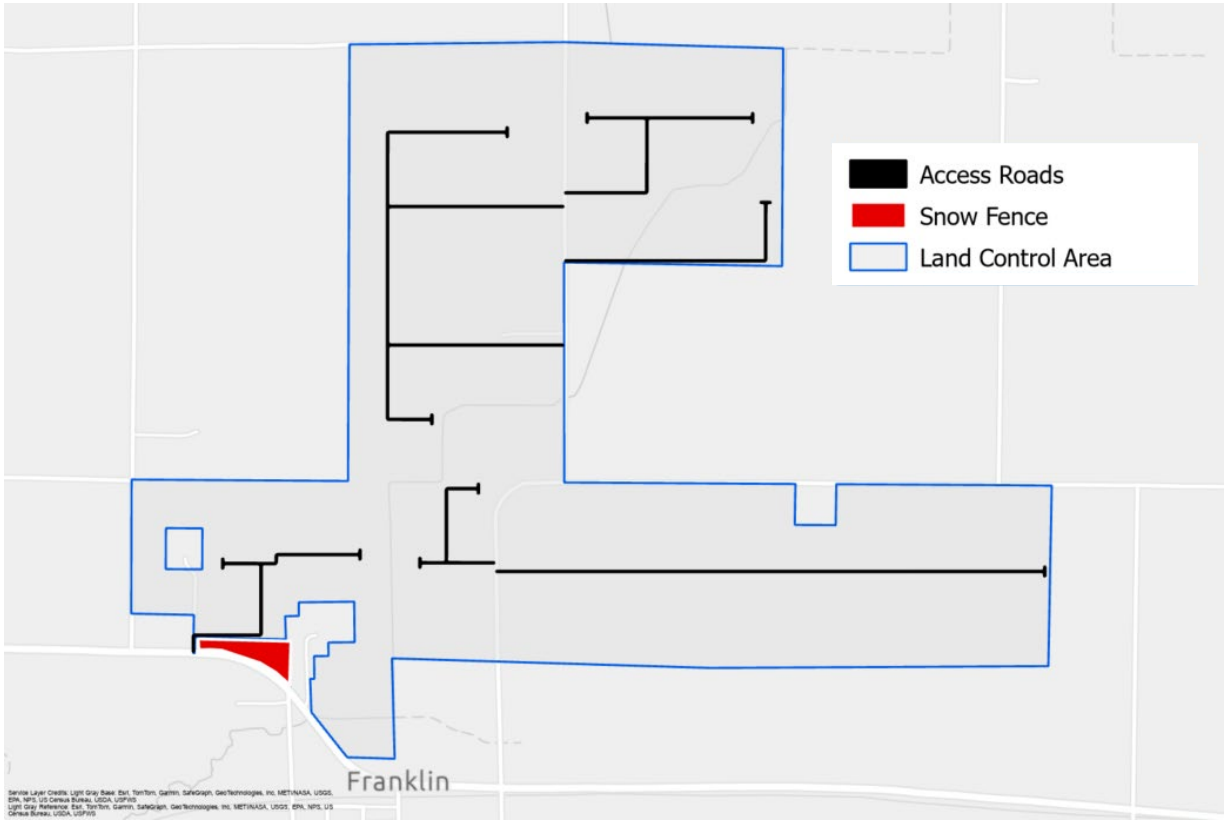
[205] Ong, N., Sadiq, M., Said, M., Jomaas, G., Tohir, M., & Kristensen, J. (2022). *Fault tree analysis of fires on rooftops with photovoltaic systems.* DOI: https://doi.org/10.1016/j.jobe.2021.103752

[206] MNDOT, Scoping Comments, October 24th, 2024, eDockets number: 202410-211275-01.

[207] MNDOT. *Statistical Relationship Between Vehicular Crashes and Highway Access*. August 1998. Retrieved from: https://dot.state.mn.us/accessmanagement/docs/pdf/research/statisticalrelationships.pdf.

TH 19 contains a living snow fence (highlighted in Figure 27[208]) that protects the road curve from snow blowing and drifting issues.[209] Damage to this snow fence resulting from vegetation removal or alteration would create a blowing snow problem, resulting in potential human safety concerns related to increases in vehicle crash and spinout rates and reduced visibility for drivers along this section of road.

Figure 27. TH 19 Snow Fence



MITIGATION

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

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

[208] MNDOT, Scoping Comments, October 24th, 2024, eDockets number: 202410-211275-01.
[209] Id.

- Section 4.3.30 requires the permittee to take several public safety measures, including landowner educational materials, appropriate signs and gates, etc.
- Section 8.12 requires permittees file an Emergency Response Plan with the Commission and local first responders prior to operation.
- Section 8.13 requires disclosure of extraordinary events, such as fires, etc.
- Section 9.1 requires a decommissioning plan prior to construction and updated every five years. Periodic updates of the plan will address the developing information on end-of-life issues related to PV panels.

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

Fire Risk and Emergency Services

Precise PV system installation can reduce fire risk resulting from inaccurate construction methods, and proactive maintenance and monitoring of electrical equipment can identify risky system components before a fire occurs. The project will be designed and constructed in compliance with applicable electric codes. Electrical inspections will ensure proper installation of all components, and the project will undergo routine inspection. Electrical work will be completed by trained technicians. Data streams from the PV Control and SCADA equipment will be monitored at the remote Regional Operations and Control Center 24/7. The Computerized Maintenance Management System will capture all maintenance required and performed onsite; the system will generate preventative, predictive, and corrective tasks considering safety, environmental conditions, criticality, and capacity. A remote engineering and technical services team will also be available to support the local solar field technicians when necessary.[210] Compliant system installation along with continual monitoring and a proactive approach to maintenance tasks will reduce fire risk within the site.

Birch Coulee Solar's VMP[211] provides additional fire risk mitigation. The plan includes a fence-line vegetation management unit composed of low-growing non-native fescues to maintain a perimeter that is less susceptible to wildfire. Additionally, site vegetation will be controlled via mowing and/or grazing, preventing the accumulation of biomass and reducing fire hazard. The use of rotating PV arrays alongside vegetation removal techniques such as grazing can reduce fire hazards.[212]

The DSP (**Appendix B**) proposes special conditions related to fire risk and public safety:

- Section 5.9 requires the permittee to develop and incorporate a Project Fire Risk Assessment into the filed Emergency Response Plan.
- Section 5.10 requires the permittee to work and train with local emergency response teams that may have to enter the Project to ensure teams are aware of access points and can perform their duties safely.

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[210] SPA, pp. 19-20.

[211] SPA, Appendix F: Vegetation Management Plan.

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

TH 19: Access Roads

Section 5.11 of the DSP is a special condition that requires the permittee to coordinate with MnDOT regarding possible mitigation measures to reduce the crash risk associated with proposed access points along TH 19. The permittee will implement mitigation measures agreed upon with MnDOT. Mitigation measures include but are not limited to, moving the access points to lower volume township or county roads or installing a temporary or permanent right-hand turn lane along TH 19.

TH 19: Living Snow Fence

Birch Coulee Solar indicates that the living snow fence identified along TH 19 does not fall under their land control area, and thus they do not anticipate any vegetation removal or alteration that will impact the snow fence.[213] Vegetation may be impacted by road runoff from the proposed access road running north along the living snow fence area, but this is not anticipated to have significant effects. If construction plans change in a way that require vegetation alteration and/or removal, or if unanticipated impacts to the snow fence do occur, Birch Coulee Solar will coordinate with MnDOT to address and minimize any safety risks due to blowing snow.

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 to moderate** — lost farming revenues will be offset by lease or easement agreements. A loss of farmland in Renville County would occur for the life of the project. Potential impacts are localized and unavoidable but can be minimized.

Agricultural use dominates approximately 97 percent (1,041.6 acres) of the land control area, with corn and soybeans are the dominant crops. Agricultural characteristics for Renville County are summarized in Table 17.

Table 17. Agricultural Characteristics – Renville County[214]

Category	2022	Percent change from 2017
Acres of farmland	626,065	0
Number of Individual farms	931	-9
Average farm size (acres)	672	+11
Average value of agricultural production	$870,338	+47

[213] Birch Coulee Solar, Response to Scoping Comments, November 6th, 2024, eDockets number: 202411-211682-01.
[214] USDA, 2022 Census of Agriculture, County Profile: Renville County, Minnesota. Retrieved from: https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27129.pdf.

Top crops (in acres)	Corn and soybeans	NA
Largest livestock inventory	Hogs and pigs, turkeys	NA

Crops compromise the majority of the market value of agricultural production in Renville County (approximately 72 percent), with the remainder from livestock, poultry, and products. In terms of acreage, corn and soybeans dominate the landscape, though Renville County also has thousands of acres of sugarbeets, vegetables, and sweet corn. Hogs and pigs comprise the largest portion of livestock revenues.

Prime farmland is defined by Federal regulation at 7 C.F.R.657.5(a)(1) as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses." Approximately 90.9 percent of the land within Renville County is considered prime farmland.[215] Nearly all the solar facility land control area is classified as prime farmland or prime farmland if drained (Table 18). With respect to prime farmland, the applicant indicates that no feasible or prudent alternatives to the project exist.

Table 18. Prime Farmland within Solar Facility[216]

Farmland Classification	Acres	% of Site
Prime Farmland	356.2	34.2
Prime Farmland if Drained	580.7	55.8
Prime Farmland if Protected from Flooding	0	0.0
Farmland of Statewide Importance	104.7	10.1
Not Prime Farmland	0	0.0
Total	**1, 041.6**	**100**

Over the past century, many farmers in the area have installed subsurface drainage systems to enhance crop yield. These systems use perforated pipe placed at a slope to move excess water from the crop root zone to a ditch or other outlet. Most drainage pipe used today is plastic, but because concrete or clay pipes were used historically, terms such as tile or tiling or drain tile are still used. Tiling can enhance crop productivity by lowering the water table, improving soil aeration, and allowing the soil to warm and dry more quickly in the spring.[217]

Potential Impacts

The impact intensity level will range from minimal to moderate. The intensity of the impact is likely to be subjective. For example, conversion of farmland to solar energy production can be viewed as a conversion from one type of industrial use to another. Conversely, the conversion of farmland to solar energy production can be

[215] SPA, Appendix E: Prime Farmland Analysis, p. 4
[216] SPA, Appendix E: Prime Farmland Analysis, p. 5.
[217] University of Minnesota Extension. *Impact of Agricultural Drainage in Minnesota.* (2018). Retrieved from: https://extension.umn.edu/agricultural-drainage/impact-agricultural-drainage-minnesota#sources-1360510.

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 768.2 acres of farmland being removed from agricultural production for the life of the project. This change in land use would take productive farmland out of production for the life of the project, representing approximately 0.1 percent of existing agricultural land in Renville County. The applicant indicates that the land could be returned to agricultural uses after the project is decommissioned and the site is restored.

Soil Compaction and Erosion

Construction of the project has the potential to damage agricultural soils through compaction or erosion if BMPs are not implemented to minimize damage. Soil compaction could occur during the construction phase due to the heavy axle loads and tire contact pressure from equipment used to install project components. Compaction reduces soil pore size, resulting in reduced water infiltration, internal drainage, and holding capacity. The increased water retainment in compacted soils delays warming in the spring, which can result in late and uneven emergence of crops. Crops grown in compacted soils, which are difficult to penetrate, develop restricted root systems, limiting their nutrient uptake ability. The consequences of these compaction-induced effects on crop development can result in nutrient-deficient crops with poor growth, leading to overall reductions in yield.[218]

Soil erosion could result from the ground-disturbing and grading activities necessary during the construction phase. Erosion could be heightened if during wet or windy conditions. Topsoil, considered the most productive soil layer, is rich in nutrients and organic matter. Declines in topsoil nutrients and thickness resulting from erosion can cause significant reductions in crop yield[219] and require supplementation with fertilizers and agricultural treatments, increasing production costs. Subsoil, while less productive than topsoil, contains important stores of water and nutrients that are essential for high yields, particularly in areas with nutrient-depleted topsoil.[220]

Prime Farmland

In Minnesota, no large electric power generating site may be permitted where the developed portion of the plant site includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative. Economic considerations alone do not justify the use of more prime farmland.[221] With a generating capacity of up to 125 MW, the project, by rule, should impact no more than 62.5 acres of prime

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

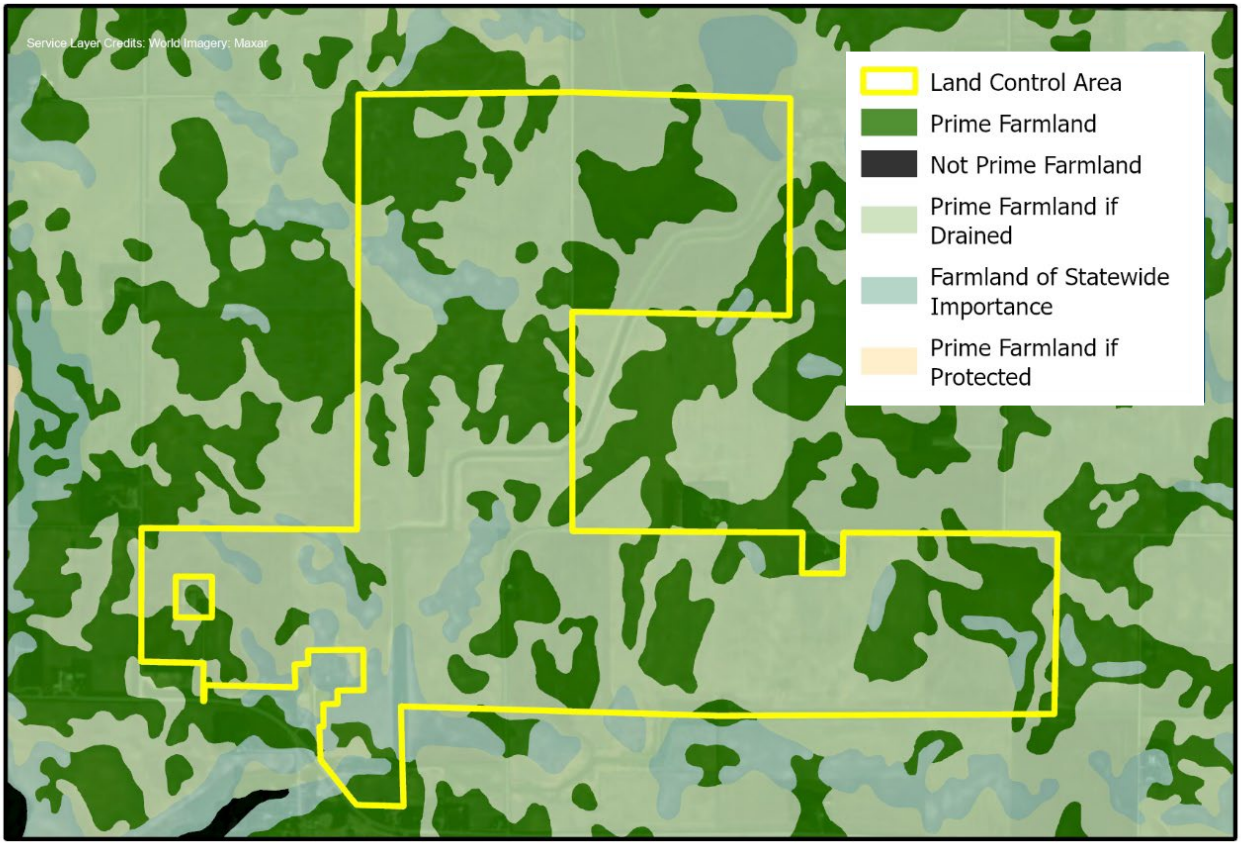
[219] Zhang, L., Huang, Y., Rong, L., Duan, X., Zhang, R., Li, Y., & Guan, J. (2021). *Effect of soil erosion depth on crop yield based on topsoil removal method: A meta-analysis*. DOI: https://doi.org/10.1007/s13593-021-00718-8

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

[221] Minnesota Rule 7850.4440.

farmland. This is substantially less than the actual acreage of prime farmland affected, which is conservatively estimated to be 936.9 acres of prime farmland (Figure 28, Table 18).[222]

Figure 28. Prime Farmland in Project Area



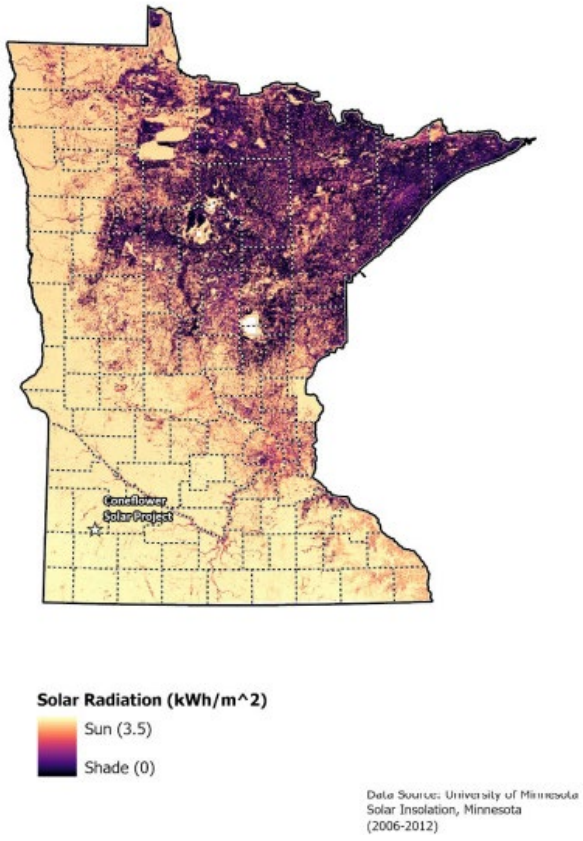
An assessment of the availability of feasible and prudent alternatives is an important component in the Commission's review of the project. Commerce and MDA jointly developed a guidance document to assist developers when evaluating potential solar sites relative to the feasible and prudent language in the rule.[223] Since the state of Minnesota has mandates to both advance solar energy production and protect prime farmland, and due to the inherent difficulties in avoiding prime farmland, the guidance document is meant to assist developers in defining feasible and prudent in relation to siting alternatives, and to encourage them to build a record early in the site selection pro0cess showing whether or not an exception to the prime farmland exclusion is warranted.

[222] This is based on the project boundaries, not the preliminary development area, thus contains more land than will be constructed on. However, Birch Coulee Solar will have site control over all land within the project boundary.

[223] Commerce, MDA. 2020. *Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives*. https://apps.commerce.state.mn.us/eera/web/doc/13929.

Birch Coulee Solar conducted a Prime Farmland Analysis[224] which provides an analysis of sitings constraints explaining the factors behind their location choice. The first siting factor considered was the level of horizontal solar irradiance in a region; the high levels present in southwestern Minnesota led them to focus on this region of the state (Figure 29[225]). Birch Coulee Solar identified two potential interconnection points: one in Renville County near the Franklin 115 kV substation, and one in Stearns County near the Wakefield 115 kV substation. The potential site near the Wakefield 115 kV substation contained less prime farmland (37.3 percent designated prime farmland) compared to the potential site near the Franklin 115 kV substation (75.6 percent designated prime farmland). However, landowners in proximity to the potential near the Wakefield 115 kV substation were unwilling to participate in the project. As such, the applicant indicates that no feasible or prudent alternatives to the project exist.

Figure 29. Minnesota Solar Irradiance



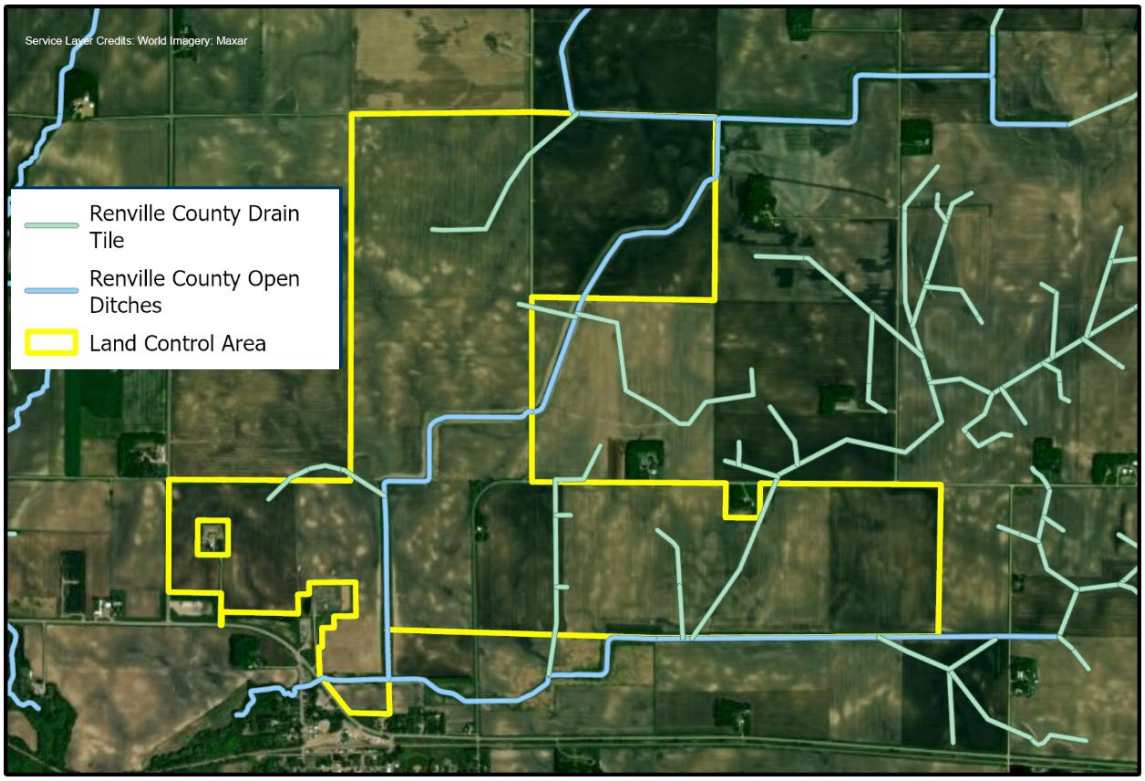
[224] SPA, Appendix E: Prime Farmland Analysis.

[225] Brink, C., Gosack, B., Kne, L., Luo, Y., Martin, C., McDonald, M., Moore, M., Munsch, A., Palka, St., Piernot, D., Thiede, D., Xie, Y., & Walz, A. (2015). Solar Insolation, Minnesota (2006-2012). Retrieved from the Data Repository for the University of Minnesota (DRUM), http://dx.doi.org/10.13020/D6X59X

Ditches and Drain Tile

Drain tile is an important agricultural practice in the Midwest. Drain tile can be particularly useful to improve crop productivity of poorly drained soils.[226] Soil classified as "Prime farmland if drained" makes up approximately half of the land control area (Table 18) and a significant amount of the neighboring properties (Figure 28). Private drain tile is present throughout the land control area, as are several Renville County ditches which provide important drainage services for the surrounding landowners (Figure 30). Damaged or blocked tile lines can impede soil drainage and impact productivity. The interconnected nature of the drainage system demonstrates that even if damage to a tile line happened within the project boundaries, non-participating landowners could experience impacts to crop yield. Additionally, the decommissioning plan indicates that the site will be restored to its prior use[227] (97 percent cultivated farmland). Damage to drainage systems within the project boundaries could prevent participating landowners from returning their land to agricultural practice.

Figure 30. Project Area Drainage



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

[227] SPA, p. 20.

MITIGATION

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

- Section 4.3.9 requires protection and segregation of topsoil.
- Section 4.3.10 requires measures to minimize soil compaction.
- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls to ensure that stormwater does not become a problem on or off-site.
- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".
- Section 4.3.17 requires the permittee to develop a VMP that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Birch Coulee Solar has included a draft VMP as Appendix F of its site permit application.
- Section 4.3.18 requires the permittee to develop an AIMP with MDA. Birch Coulee Solar's draft AIMP (Appendix D of its site permit application) details methods to minimize soil compaction, preserve topsoil, control noxious weeds and invasive species, maintain the existing drainage conditions through appropriate maintenance and repair of existing drain tile, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.
- Section 4.3.20 requires the permittee to develop an Invasive Species Management Plan to prevent introduction and spread of invasive species during construction of the project.
- Section 4.3.21 requires the permittee to take reasonable precautions against the spread of noxious weeds.
- Section 4.3.25 requires the permittee to avoid, repair, or replace all drainage tiles broken or damaged during all phases of the project's life.
- Section 4.3.29 requires the permittee to fairly restore or compensate landowners for damages to crops, fences, drain tile, etc. during construction.

Birch Coulee Solar indicates that best management practices (BMPs) would be implemented during construction in order to minimize and mitigate long-term impacts to agricultural lands, including performing regular inspections during any earthmoving phases, preventing soil profile mixing, monitoring compaction, halting construction during wet weather conditions, ensuring proper site drainage and erosion control, and limiting the spread of noxious weeds and invasive species by cleaning construction equipment. Following construction, Birch Coulee Solar indicates that disturbed areas would be repaired and restored to pre-construction contours and characteristics to the extent possible.[228,229]

[228] SPA, Appendix D: Agricultural Impact Mitigation Plan
[229] SPA, Appendix F: Vegetation Management Plan

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

4.5.2 Tourism

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

Tourism in the local area is primarily limited to outdoor recreational activities, including snowmobile trails, public lands, and the Minnesota River, along with local community events.

POTENTIAL IMPACTS

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

MITIGATION

Traffic management is addressed in special condition Section 5.6 of the DSP; the developed control plan will mitigate potential traffic impacts during local events, such as Franklin's Catfish Derby Days event, which may coincide with construction season.

4.6 Archeological, Cultural, and Historic Resources

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

Archeological resources are locations where objects or other evidence of archaeological interest exist, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.[230] Historic resources are sites, buildings, structures, or other antiquities of state or national significance.[231]

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

Birch Coulee Solar reports contacting the eleven federally recognized Tribal Nations in Minnesota, including Minnesota Tribal Nations' Tribal Historic Preservation Officers (THPOs) and the Minnesota Indian Affairs Council (MIAC) for additional information or comment on the project.[232] MIAC noted that the proposed project intersects with, and is near, several state archeological sites, and is located within an area that is likely to contain cultural

[230] Minnesota Statutes, Section. 138.31, subd. 14.
[231] Minnesota. Statutes, Section 138.51.
[232] SPA, Appendix H: Agency Correspondence.

resources. MIAC recommended Birch Coulee Solar conduct additional research and cultural management fieldwork with monitoring alongside tribal consultation to regional THPOs.[233]

Birch Coulee Solar hired a contractor to conduct a Phase Ia literature review in July 2023 for the land control area and 1-mile project area radius. The survey examined records from the Minnesota State Historic Preservation Office (SHPO) and Minnesota Office of the State Archeologist (OSA). In addition, the National Register of Historic Places (NRHP) database was consulted, along with a review of available historic maps.

The literature review identified three previously recorded archaeologic sites within the 1-mile study area (Table 19), one of which, a post-contact farmstead/artifact scatter, is within the land control area itself (#21RN0038). One of these sites is an alpha site, a site that is likely to have archeological resources, but it has not been formally investigated by professional archaeologists. The literature review identified 19 previously recorded historic architectural resources (Table 19), none of which are within the land control area. One of these properties has been determined not eligible for listing on the NRHP, while the remaining 18 properties have not been evaluated for listing on the NRHP.[234]

Table 19. Archeologic Sites and Historic Architectural Resources Within 1 Mile of the Site[235,236]

Site Number	Description	NRHP Eligibility	Within Site
Archeologic Sites			
21RN0038	Post-contact Farmstead/Artifact Scatter	Not Eligible	Yes
21RN0051	Precontact/ Lithic Scatter	Unevaluated	No
21RNad	Post-contact/Alpha Site/Trading Post	Unevaluated	No
Historic Architectural Resources			
RN-BCO-002	Finn Town	Unevaluated	No
RN-CAM-001	Finnish Lutheran Church	Unevaluated	No
RN-FRC-001	Grain Elevator	Unevaluated	No
RN-FRC-002	Methodist Church	Unevaluated	No
RN-FRC-003	Franklin Fire Hall	Unevaluated	No
RN-FRC-004	St. Luke's Lutheran Church	Unevaluated	No
RN-FRC-005	Commercial Building	Unevaluated	No
RN-FRC-006	State Bank of Franklin	Unevaluated	No
RN-FRC-007	Citizen's State Bank	Unevaluated	No
RN-FRC-008	Commercial Building	Unevaluated	No
RN-FRC-009	Commercial Building	Unevaluated	No

[233] SPA, Appendix H: Agency Correspondence.
[234] SPA, p. 50.
[235] SPA, p. 50, Table 4-12: Archeologic Sites Within 1 Mile of the Site
[236] SPA, p. 51, Table 4-13: Historic Architectural Resources Within 1 Mile of the Site

RN-FRC-010	House	Unevaluated	No
RN-FRC-011	House	Unevaluated	No
RN-FRC-012	Sacred Heart Church & Rectory	Unevaluated	No
RN-FRC-013	House	Unevaluated	No
RN-FRC-014	House	Unevaluated	No
RN-FRC-015	School	Unevaluated	No
RN-FRC-016	House	Unevaluated	No
XX-ROD-041	Trunk Highway 19	Not Eligible	No

The contractor evaluated the potential for the presence of cultural resources within the land control area using MnDOT's archaeological predictive model and survey implementation model, information on the environmental setting, and the proximity of previously recorded archaeological sites or historic structures. The evaluation led the contractor to determine that portions of the land control area have a moderate to high potential for the presence of cultural resources, and they recommended a targeted Phase I cultural resource survey for the project.[237]

The Phase I archaeological survey was conducted in November 2023.[238] The survey consisted of surface collection and shovel test unit excavation along with visual inspection within areas of slope, wetlands, and previous disturbance. During the survey, it was found that the previously recorded cultural resource within the land control area, 21RN0038, had been destroyed by the construction of the Franklin 115 kV substation. As such, no further work was recommended for resource 21RN0038 for this project.

Traditional Cultural Specialists (TCS) with the Lower Sioux Community and Upper Sioux Community THPOs were present during the Phase I archaeological survey. Three culturally sensitive areas of Tribal concern were documented within the land control area by the TCS staff. The THPOs have details of these areas on file. The three documented areas of Tribal concern are considered potential traditional cultural properties, but as no physical archaeological evidence of a site was found during the Phase I archaeological survey, they are not listed archaeological sites. As such, the contractor did not prepare and submit archaeological site forms for the three areas of Tribal concern to the OSA.[239]

Birch Coulee Solar provided the draft Phase I archaeological survey report to the Lower Sioux Community THPO and Upper Sioux Community THPO in February 2024. The THPOs provided feedback and comments, which Birch Coulee Solar incorporated into the report.[240] Birch Coulee Solar provided the updated Phase I Archaeological Investigation report to the SHPO for concurrence on March 15, 2024, and received concurrence from the SHPO on May 3, 2024, that "no additional work is recommended for the project to proceed as planned."[241]

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[237] SPA, p. 51.
[238] SPA, Appendix I: Phase I Archeological Resource Investigation for Birch Coulee Solar Project, Renville County, MN SHPO Number: 2023-2896.
[239] SPA, pp. 51-52.
[240] SPA, Appendix H: Agency Correspondence.
[241] SPA, Appendix H: Agency Correspondence.

MITIGATION

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

Birch Coulee Solar indicated that before construction begins, an Unanticipated Discoveries Plan will be prepared and should any previously unknown cultural resources or human remains be encountered, work will stop, and the discovery will be examined by an archaeologist. If the discovery is determined to be a significant cultural resource, SHPO and OSA will be notified.[242]

Birch Coulee Solar states that they will continue to coordinate with the THPOs from the Lower Sioux Community and Upper Sioux Community regarding measures to avoid and/or mitigate impacts to the identified culturally sensitive areas of Tribal concern within the land control area.[243]

No additional mitigation is proposed.

4.7 Natural Resources

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

4.7.1 Air Quality

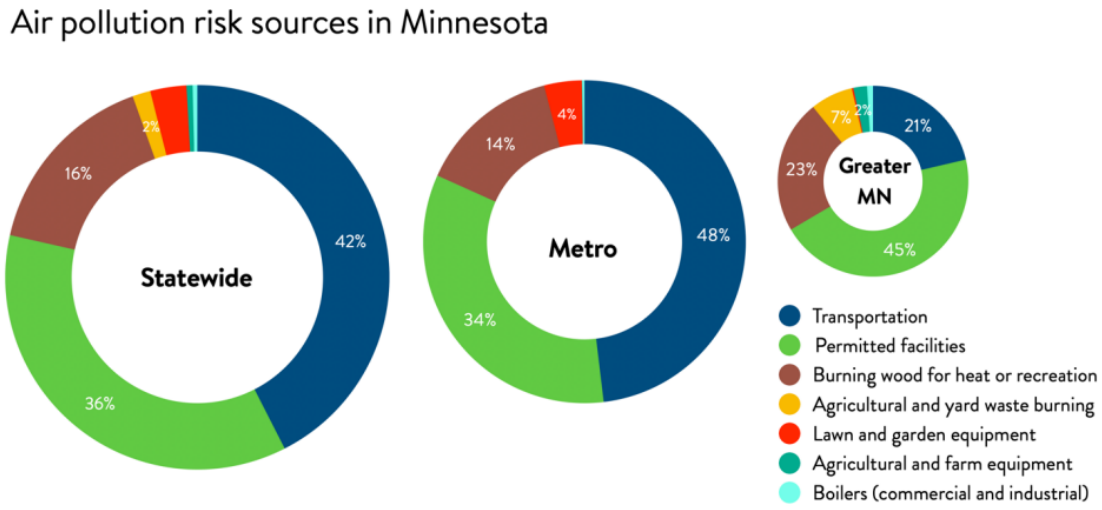
The ROI for air quality is the region. Potential impacts to air quality during construction would be intermittent, localized, short-term, and **minimal**. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated. Once operational, the solar array will not generate criteria pollutants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

Air quality is a measure of how pollution-free the ambient air is and how healthy it is for humans, other animals, and plants. Emissions of air pollutants will occur during construction and operation of new infrastructure for the project. Regulation and voluntary action throughout Minnesota has led to a reduction in air pollution over time. As a result, overall air quality in Minnesota has improved over the last 20 years, and the state has generally remained in compliance with tighter national ambient

[242] SPA, p. 52.
[243] Id.

air quality standards (NAAQS). However, current levels of air pollution still contribute to health impacts, and environmental justice communities are still disproportionately affected by air pollution. As illustrated in Figure 31, today, most of our air pollution comes from smaller, widespread sources that we all contribute to on our own such as vehicles and lawn equipment. Additionally, increasing trends of fine particle concentrations from Western wildfire smoke infiltrating Minnesota skies are expected to continue due to climate change.[244]

Figure 31. Air Pollution Sources by Type



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

Air quality in the project area is relatively better than more populated areas of the state such as the Twin Cities metro region. According to MPCA models, air pollution in the project area's census tract is in the lowest 10% of all air scores in Minnesota, with a fine particles (PM2.5) ranking in 5% of PM2.5

[244] The State of Minnesota's Air Quality, January 2025 Report to the Legislature, https://www.pca.state.mn.us/sites/default/files/lraq-1sy25.pdf

[245] 2025 Air Monitoring Network Plan for Minnesota. https://www.pca.state.mn.us/sites/default/files/aq10-24a.pdf

levels. The top four air pollutants are chromium, PAHs, ammonia, and benzene, released from permitted facilities, agriculture, and traffic, but no air pollutants are above the health benchmark.[246]

The nearest air quality monitor to the project is in Marshall, Minnesota, approximately 50 miles west of the land control area. The station monitors ozone and fine particles (PM2.5). Table 20 lists the daily air quality index category for the area for the past 7 years.[247] Overall, air quality is largely categorized as good throughout the year, with some moderate days occurring. There were a handful of unhealthy for sensitive groups and unhealthy days in the last three years (2021-2023), but no very unhealthy days.

Table 20. Daily Air Quality Index Categories in Marshall, Minnesota

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

Potential Impacts

Construction

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

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

[246] Pollution Control Agency (n.d.). *MNrisks: Pollutant Priorities*, retrieved from: https://experience.arcgis.com/experience/bff19459422443d0816b632be0c25228/page/Page/?views=Air-pollution-score

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

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions. The project will generate fugitive dust from travel on unpaved roads, grading, and excavation. Dust emissions would be greater during dry periods and in areas where fine-textured sols are subject to surface activity. The land control area is bordered by several unpaved roads that already experience notable dust emissions from normal traffic due to dry conditions.[248] The increased vehicular traffic anticipated during the construction phase could intensify dust emissions for area residents.

Operation

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

MITIGATION

Birch Coulee Solar indicates that best management practices will be used during construction and operation of the project to minimize dust and emissions. Exhaust emissions can be minimized by using modern equipment with lower emissions ratings and properly functioning exhaust systems, not running the equipment unless necessary, and minimizing the number of driving trips. Watering exposed surfaces, covering open-bodied haul trucks, reducing speed limits on unpaved roads, containing excavated materials and treating stockpiles, and protecting and stabilizing soils are all standard construction practices.[249]

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

The AIMP identifies construction best management practices related to soils and vegetation that will help to mitigate against fugitive dust emissions. Several sections of the draft plan indirectly mitigate impacts to air quality, including sections related to construction and vegetation removal, soils, erosion and sediment control, and restoration of the site to pre-construction conditions.[250]

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[248] Oral Comments on the Scope of Environmental Assessment, Public Scoping and Information Meetings, Franklin, Minnesota, October 9th, 2024 and virtual meeting, October 10th, 2024, eDocket ID: 202411-212174-01.

[249] SPA, p. 54.

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

4.7.2 Geology and Groundwater

The ROI for geology and groundwater is the land control area. The presence of a Drinking Water Supply Management Area in the project area creates a potential for both direct and indirect impacts to groundwater due to project construction. Impacts to domestic water supplies are anticipated to be **minimal to moderate**. 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.

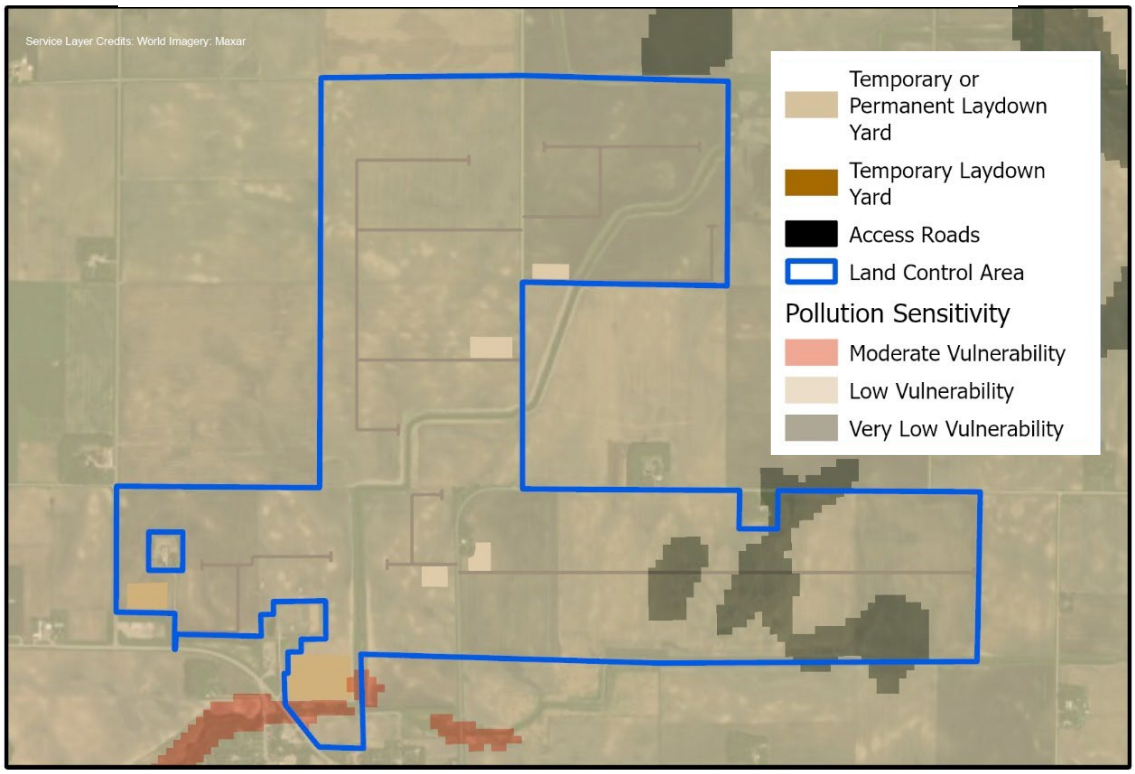
Groundwater in Minnesota is largely a function of local geologic conditions that determine the type and properties of aquifers. Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The project is within Province 5, the Western Province, and is characterized by moderate surficial sands and limited buried sands. Province 5 is underlain by fractured bedrock buried deeply beneath glacial sediment, and is of limited use as an aquifer. In this province, sediment is relatively fine grained with higher amounts of clay and silt, and aquifers are less common.[251]

Pollution sensitivity of near surface materials in the land control area are mostly in the "low" to "very low" category, with a small amount of "moderate" area (Figure 32).[252] 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.[253]

The project area is overall expected to have low groundwater pollution sensitivity; contaminants from the land surface in the "low" pollution sensitivity areas would not reach groundwater for weeks to months, while contaminants from the land surface in the "very low" pollution sensitivity areas would not reach groundwater for months to a year. Contaminants from the land surface in the "moderate" groundwater pollution sensitivity area would reach groundwater in one to several weeks.[254] 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.

[251] DNR, Minnesota Groundwater Provinces (2021) https://www.dnr.state.mn.us/waters/groundwater_section/mapping/provinces.html
[252] Minnesota Natural Resource Atlas, retrieved from https://mnatlas.org/gis-tool/.
[253] 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.
[254] 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 .

Figure 32. Pollution Sensitivity of Near Surface Materials within Project



Depth to bedrock beneath the project is estimated to be greater than 100 ft.[255] Depth to water table in the preliminary development area ranges from just below the surface to more than 50 inches depending on the soil type.[256] Depth to water table is shallower in the hydric soils and areas delineated as wetland or along watercourses, and deeper in the non-hydric soil units. In areas with drain tile, the depth to groundwater is altered and likely deeper than what has been reported on the USDA Web Soil Survey. Prior to construction, Birch Coulee Solar will conduct a geotechnical investigation to confirm the depth to groundwater.

Minnesota Well Index

The land control area was reviewed for EPA designated sole source aquifers, wells listed on the MWI and MDH Wellhead Protection Areas (WHPAs).[257] The MDH maintains the MWI, which provides basic information (e.g., location, depth, geology, construction, and static water level) for wells and borings drilled in Minnesota. The MWI does not identify any documented wells within the land control area,

[255] Minnesota Natural Resource Atlas – Depth to Bedrock. Retrieved from: https://mnatlas.org/gis-tool/
[256] Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
[257] SPA, pp. 55-56.

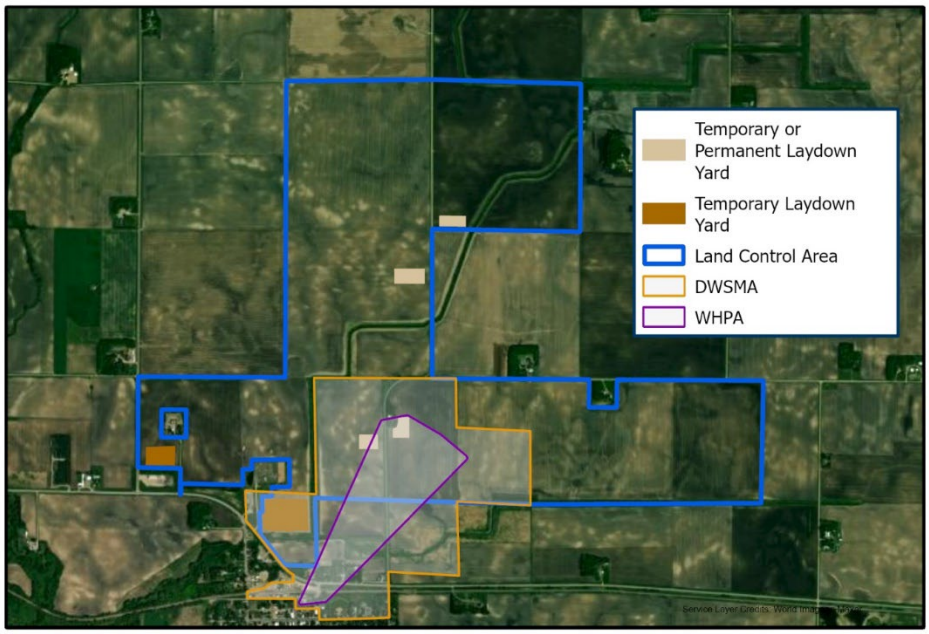
however, as of 2025, there are five active domestic wells, two active "other" wells, and two unverified wells within a quarter mile of the project, ranging from 50 to 227 feet in depth.[258]

Wellhead Protection Areas

Under the Safe Drinking Water Act, each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. WHPAs are determined by MDH as "areas surrounding public water supply wells that contribute groundwater to the well. In these areas, contamination on the land surface or in water can affect the drinking water supply."[259] WHPA encompasses the area around a drinking water well where contaminants could enter and pollute the well.

Public and non-public community water supply source-water protection in Minnesota is administered by the MDH through the Wellhead Protection program. WHPAs for public and community water-supply wells are delineated based on a zone of capture for 10-year groundwater time-of-travel to the well and are available through a database and mapping layer maintained by MDH (2023b). The MDH mapping layer also includes the Drinking Water Supply Management Areas (DWSMA) and SWSMA Vulnerability rankings. A search for WHPAs in the MDH database indicated that the southwestern section of the land control area contains a WHPA and a DWSMA with a vulnerability designation of low (Figure 33).[260]

Figure 33. Project Groundwater Resources



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

POTENTIAL IMPACTS

Potential impacts to geology and groundwater can occur directly or indirectly. Direct impacts to groundwater are generally associated with construction, for example, structure foundations that could penetrate shallow water tables or groundwater usage. 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. Birch Coulee Solar acknowledges that the construction of a solar project will create an increase in impervious and semi-impervious surfaces within the area of land control. This could lead to an increase of stormwater runoff, and in turn reduce groundwater recharge.[261]

While the majority of the project area has a pollution sensitivity of near surface materials of "low" or "very low," there is one small section in the southwest of the project ranked "moderate" (Figure 32). This "moderate" area falls within the WHPA and low vulnerability DWSMA shown in Figure 33. The current project layout places the largest temporary laydown yard (Figure 11) and two permanent laydown yards within the southern portion of the project that contains the WHPA, low vulnerability DWSMA, and "moderate" pollution sensitivity section. Birch Coulee Solar intends to use the temporary laydown yard for equipment deliveries, vehicle parking, and equipment and material storage during the construction phase. During operation, some of the two permanent laydown yards will be used for vehicle parking and equipment and parts storage. If these laydown yards are used refueling or the storage of gasoline, any leaks or spills could result in groundwater contamination.

If the project facilities include oil storage of more than 1,320 gallons, a Spill Prevention, Control, and Countermeasure (SPCC) Plan would be required. Birch Coulee Solar states that they will prepare an SPCC Plan prior to construction for construction-related fuel storage and prior to operation for operation-related fuel storage, should said storage exceed applicability thresholds.[262] Birch Coulee Solar states that the proposed location of the project substation, which will contain the main transformer, associated aboveground storage tank, and secondary containment, is outside of the WHPA and DWSMA. They will prepare and implement an SPCC Plan for the main transformer at the project substation in accordance with EPA requirements.[263]

Because of the shallow depth to groundwater in some areas of the project, dewatering may be required during construction. If dewatering exceeds 10,000 gallons of water per day, a DNR water appropriation permit will be required.[264] Project structures as proposed are generally a suitable distance from areas of sloping which are near large drainage features.

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[261] SPA, p. 57.
[262] SPA, p. 5.
[263] SPA, p. 58.
[264] DNR, Water Use Permits: retrieved from: https://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html

Although design is not yet finalized, if Birch Coulee Solar opts to install the O&M building within a permanent laydown yard in the preliminary development area, they will also likely install a well to provide water for drinking and sanitary services for approximately four employees.[265]

Impacts to geological resources are likely to be minimal, due to the presence of fractured bedrock and limited use of aquifers, and the absence of karst features. Construction of the project is not likely to require subsurface blasting, and newly fractured bedrock causing groundwater flow is not anticipated.

PV arrays will be installed on direct-embed steel pile foundations with a depth of approximately six to nine feet below the soil surface and the gen-tie line will be installed on steel monopole structure(s) with the depth determined by geotechnical studies and engineering information prior to construction. Depending upon the subsoil strength and location, deeper foundations or structural fill may be required at some locations to ensure stability of the project infrastructure.

Birch Coulee Solar plans to complete a geotechnical investigation prior to final project design to confirm if shallow bedrock is present. If shallow bedrock is found, project structures in these areas may require concrete foundations instead of driven piers.[266] 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.[267]

MITIGATION

Stormwater management is important to ensure that structure foundations maintain their integrity and that rainwater and surface runoff drain away from the project structures and roads in a way that does not adversely affect existing drainage systems, roads, or nearby properties. Appropriate permanent stormwater management measures, including minimizing the area of impervious surfaces onsite to reduce the volume and velocity of the stormwater runoff and the establishment of multiple stormwater ponds, will address drainage from the newly established impervious areas. Birch Coulee Solar indicates that solar panels will be mounted above the ground with a low-maintenance perennial seed mix underneath, allowing water to filter into vegetation and soil prior to discharging.

Any new wells require notification to MDH and would be constructed by a well borer licensed by MDH. If any previously unmapped wells are discovered, Birch Coulee Solar should cap and abandon the well in place in accordance with MDH requirements.

Because the project will disturb more than one acre, Birch Coulee Solar must obtain a CSW Permit from the MPCA. The CSW Permit will identify BMPs for erosion prevention and sediment control. As part of the CSW Permit, Birch Coulee Solar will also develop a Stormwater Pollution Prevention Plan (SWPPP) that describes construction activity, temporary and permanent erosion and sediment

[265] SPA, p. 46.
[266] SPA, p. 56.
[267] See Department of Commerce (May 14, 2018) *Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project*. Retrieved from: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/34748/1%20Text%20Figures%20Tables.pdf

controls, BMPs, permanent stormwater management that will be implemented during construction and through the life of the project. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion and detail stormwater management methods during construction and operation of the facility. Section 4.3.11 of DSP (**Appendix B**) requires the permittee to obtain a MPCA CSW Permit and implement the BMPs within for erosion prevention and sediment control. Impacts to groundwater can also be minimized by mitigating impacts to 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 Birch Coulee Solar from the MPCA. BMPs will be used during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion, whether the erosion is caused by water or wind. Practices may include containment of excavated material, protection of exposed soil, stabilization of restored material, and treating stockpiles to control fugitive dust.[268]

Any dewatering required during construction will be discharged to the surrounding upland vegetation, thereby allowing it to infiltrate back into the ground to minimize potential impacts.

Section 5.12 of the DSP is a special condition that requires the permittee to develop and file a project Laydown Area Protection Plan for laydown areas within the Wellhead Protection Area and Drinking Water Supply Management Area. The plan should describe how vehicles that would use the laydown areas will be kept well-maintained and inspected for oil and gasoline leaks, the spill-minimizing BMPs that will be used for any re-fueling of construction equipment, and appropriate containment measures for any spills that might happen.

4.7.3 Soils

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

The soils deposited in the land control area (Table 21) are made up of nearly level, poorly drained, loamy soils. Hydric soils cover a slightly larger area (588.2 acres) of the site compared to nonhydric soils (453.4 acres). Topsoil in the land control area, including the preliminary development area, has a thickness ranging from 0 – 18 inches and is predominantly classified as a “slight” erosion hazard ranking. Overall, the site is not highly susceptible to either wind or water erosion. The soils within the land control area are only somewhat susceptible to compaction (approximately 29% compaction-prone), but they are highly susceptible to rutting (100% severe rutting hazard). Compaction and rutting will worsen when heavy equipment is used on fine- or medium-textured soils with wet conditions. Most of the soils within the preliminary development area and land control area are

[268] SPA, p .78

designated prime farmland if drained (55%), and the rest is designated farmland of state importance (10%) and prime farmland (34%).[269]

Table 21. Soil Types in Solar Facility Land Control Area[270]

Soil type	Drainage Class	Acres	Percent of Project
Clarion loam, 2 to 6 percent slopes	Moderately well drained	46.0	4.4%
Harps clay loam, 0 to 2 percent slopes	Poorly drained	64.2	6.2%
Crippin loam, 1 to 3 percent slopes	Somewhat poorly drained	6.7	0.6%
Clarion-Storden-Pilot Grove complex, 6 to 10 percent slopes, moderately eroded	Well drained	13.1	1.3%
Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded	Well drained	12.2	1.2%
Delft clay loam, 0 to 2 percent slopes	Poorly drained	13.5	1.3%
Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes	Very poorly drained	41.4	4.0%
Klossner muck, depressional, calcareous, 0 to 1 percent slopes	Very poorly drained	7.4	0.7%
Canisteo clay loam, 0 to 2 percent slopes	Poorly drained	5.2	0.5%
Clarion-Swanlake complex, 2 to 6 percent slopes	Moderately well drained	160.5	15.4%
Clarion-Storden-Hawick complex, 2 to 6 percent slopes	Well drained	72.0	6.9%
Canisteo-Glencoe complex, 0 to 2 percent slopes	Poorly drained	392.1	37.6%
Okoboji silty clay loam, 0 to 1 percent slopes	Very poorly drained	43.7	4.2%
Webster clay loam, 0 to 2 percent slopes	Poorly drained	20.5	2.0%
Nicollet clay loam, 1 to 3 percent slopes	Somewhat poorly drained	143.0	13.7%
Solar Facility Subtotal		**1,041.6**	

Potential Impacts

Primary impacts to soils include compaction from construction equipment, soil profile mixing during grading and pole auguring, rutting from tire traffic, drainage interruptions, and soil erosion. Impacts to soils are likely to be greatest with the below-ground electrical collection system. Potentials impacts will be positive and negative, and short- and long-term. Isolated moderate to significant negative

[269] SPA, Appendix D: Agricultural Impact Mitigation Plan.
[270] SPA, p. 58.

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 1,041 acres within the land control area. Of this, approximately 768 acres will be graded, which consists of cutting and filling earth in targeted areas, to provide a level and stable base for the project substation and access roads, and spot grading at select solar array and inverter skid locations when the arrays cannot follow existing grades.

Topsoil depth varies throughout the land control area, but most of the land is characterized by topsoil depths of greater than 15 inches. Grading and excavating will separate the first 12 inches of topsoil, which will be stored on-site and replaced when construction is completed. Approximately 8.8 miles of underground collector and communication lines will be installed in trenches or conduits at least 3 feet below the surface.[271]

As with any ground disturbance, there is potential for soil compaction and erosion. Heavy rainfall events during construction or prior to establishment of permanent vegetation, increase the risk that significant sedimentation and erosion could occur. Inadvertent disturbance of drain tile from construction activities could disrupt existing drainage.

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

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

MITIGATION

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

- Section 4.3.9 requires protection and segregation of topsoil;
- Because the project will disturb more than one acre, Birch Coulee Solar must obtain a CSW Permit from the MPCA. The CSW Permit will identify BMPs for erosion prevention and sediment control. As part of the CSW Permit, Birch Coulee Solar will also develop a SWPPP that describes construction activity, temporary and permanent erosion and sediment controls, BMPs, permanent stormwater management that will be implemented during construction and through the life of the project. Section 4.3.11 requires the permittee to

[271] SPA, Appendix D: Agricultural Impact Mitigation Plan, p. 14.

obtain a MPCA CSW Permit and implement the BMPs within for erosion prevention and sediment control.

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

4.7.4 Surface Water and Floodplains

The ROI for surface water resources is the land control area. The impact intensity level is anticipated to be **minimal to moderate**. Direct impacts to surface waters are not expected. Indirect impacts to surface waters might occur. These impacts will be short- and long-term. Drainage systems within the land control area could extend impacts to the Minnesota River. Impacts can be mitigated.

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

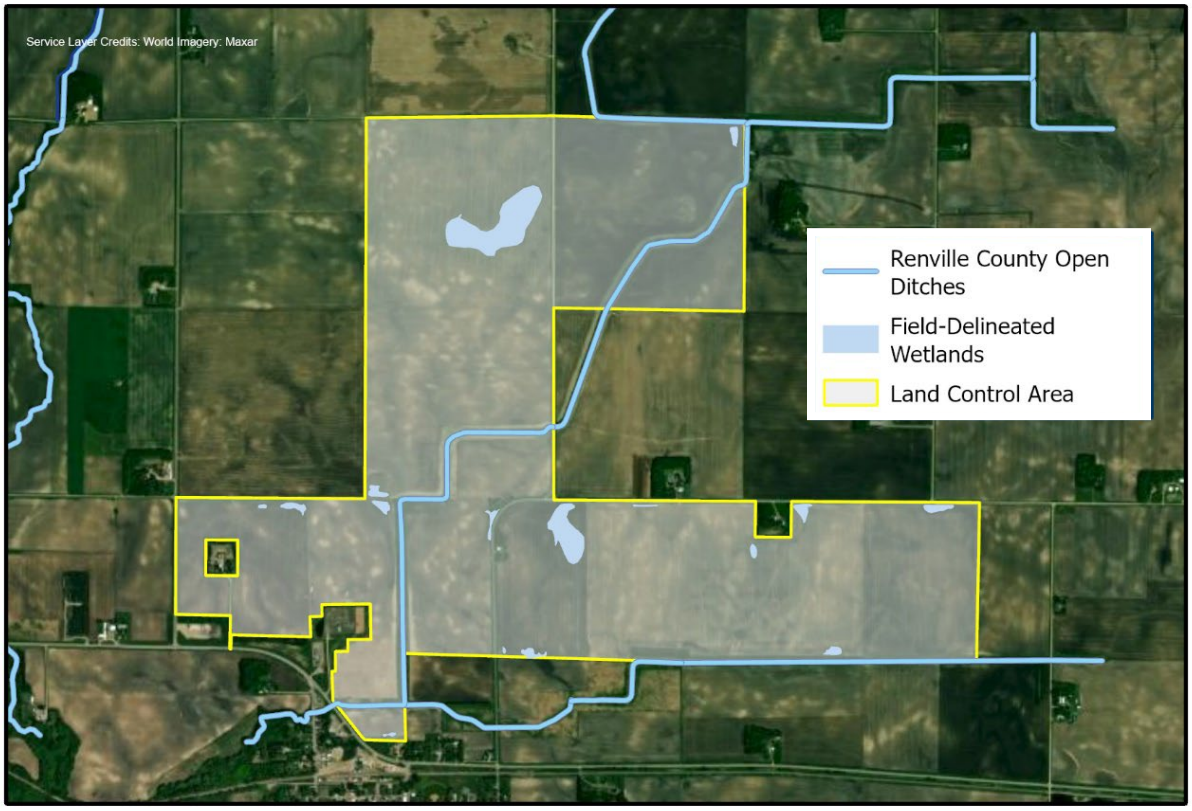
The project is in the Minnesota River – Mankato watershed of the Minnesota River Basin.[272] There are no lakes, rivers, or streams that cross the land control area. The DNR's Public Waters Inventory identified no watercourses or basins within the land control area. Public waters include wetlands, water basins, and watercourses of significant recreational or natural resource value in Minnesota. A public waters designation means that DNR has regulatory jurisdiction over the water.[273] There are no Public Waters Inventory (PWI) waterbodies within the area of land control. The nearest Public Waters Inventory (PWI) body of water is County Ditch 111, approximately 0.7 miles northwest of the project, and the Minnesota River, approximately 1 mile south of the project.[274]

The surface waters within the land control area are limited to county drainage ditches and wetlands (Figure 34). County Ditch 109A is an open ditch system that crosses the project from the northeast corner to the south. Judicial Ditch 14-23 is an open ditch system that crosses east/west along the

[272] Minnesota DNR, Minnesota's watershed basins. https://www.dnr.state.mn.us/watersheds/map.html
[273] Public waters are defined in Minnesota Statute 103G.005, subdivision 15.
[274] Minnesota DNR. *Public Waters (PW) Basin and Watercourse Delineations*. Minnesota Geospatial Commons: https://gisdata.mn.gov/dataset/water-mn-public-waters

southern boundary of the project before joining County Ditch 109A. The Renville County Drainage Department manages both ditches and their associated drain tiles within the land control area.[275]

Figure 34. Project Surface Waters



Surface runoff in the project generally moves south and southwest into the county-managed open ditches, following the elevation decline towards the Minnesota River. County Ditch 109A flows into the Minnesota River via Purgatory Creek, a watercourse approximately one mile to the southwest of the project. The westernmost section of the project drains to County Ditch 131, which then eventually flows to the Minnesota River via Purgatory Creek.[276]

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.

[275] SPA, pp. 60-61.
[276] SPA, pp. 60-61.

There are no waters listed by the MPCA as impaired waters within the land control area. The nearest impaired water is Purgatory Creek, approximately 0.9 miles southwest of the project, which is listed as impaired for *Escherichia coli*. The Minnesota River, approximately 1 mile south of the project, is listed as impaired for mercury and PCBs in fish tissue, nutrients, and turbidity.[277]

Floodplains are flat, or nearly flat, land adjacent to a river or stream that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which includes areas covered by the flood, but which do not experience a strong current. Floodplains prevent flood damage by detaining debris, sediment, water, and ice. The Federal Emergency Management Agency (FEMA) delineates floodplains and determines flood risks in areas susceptible to flooding. The base flood that FEMA uses, known as the 100-year flood, has a one percent chance of occurring during each year. There are no FEMA 100-year floodplains within the vicinity of the project. The nearest FEMA 100-year floodplain is associated with the Minnesota River, 1 mile south of the project.[278]

Potential Impacts

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

Construction of the project creates a potential for indirect impacts if sediment or fugitive dust created by excavation, grading, vegetation removal, and construction traffic reaches nearby surface waters. The preliminary development area's drainage system outlets into the Minnesota River, a crucial water resource that provides important watershed drainage, ecosystem, and recreational functions, via Purgatory Creek. Purgatory Creek and the Minnesota River are both listed as impaired water bodies. If appropriate erosion controls are not implemented during construction of the project, increased deposition of sediment or fugitive dust into these surface waters from stormwater runoff could worsen impairments such as turbidity.

Increased sedimentation via stormwater runoff could result in degradation to the Minnesota River by intensifying bank erosion, impacting channel morphology, or affecting aggradation and flood capacity – all factors influenced by river sediment load.[279] Damage to the Minnesota River's flood capacity resulting from insufficient stormwater runoff management may change the predicted flood risk in the FEMA 100-year floodplain surrounding the river.

Overall, the project is expected to have a long-term positive impact on water quality due to the establishment of perennial vegetation at the solar facility. However, inadequate stormwater management during construction of the project could lead to negative impacts on water quality due

[277] MPCA, MPCA Impaired Waters Viewer https://gisdata.mn.gov/dataset/impaired-waters-viewer
[278] SPA, p. 60
[279] Vázquez-Tarrío, D., Ruiz-Villanueva, V., Garrote, J., Benito, G., Calle, M., Lucía, A., & Díez-Herrero, A. (2024). *Effects of sediment transport on flood hazards: Lessons learned and remaining challenges*. DOI: https://doi.org/10.1016/j.geomorph.2023.108976

to increased sedimentation. Negative impacts could be short-term or long-term depending on the size of the sediment loads deposited into the Minnesota River.

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 BMPs such as silt fencing, to prevent sediment from entering waterbodies.[280]

Birch Coulee Solar plans to maintain drainage system integrity during construction, including rerouting, reinforcement, or other methods outlined in the AIMP filed with the Site Permit Application.[281]

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

- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls. This section also requires implementation of erosion and sediment control measures, contours graded to provide for proper drainage, and all disturbed areas be returned to pre-construction conditions. Birch Coulee Solar will also develop a SWPPP that complies with MPCA rules and guidelines. The SWPPP describes construction activity, temporary and permanent erosion and sediment controls, BMPs, permanent stormwater management that will be implemented during construction and through the life of the project. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction.
- Section 4.3.16 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".

4.7.5 Wetlands

The ROI for wetlands is the land control area. The impact intensity level is anticipated to be **minimal**. There is a potential for wetlands to be indirectly affected, with minor direct impacts if engineering constraints require fencing to cross wetlands. These impacts will be short- or long-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

[280] SPA, p. 61.
[281] SPA, Appendix D: Agricultural Impact Mitigation Plan.

marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.[282]

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

The applicant assessed the potential for wetlands within the solar farm footprint through a formal wetland delineation in July of 2023. Additional wetland analysis, including wetland mapping and identification, was conducted for this EA using desktop reviews of available resource (i.e., National Wetlands Inventory (NWI) data, MNDNR Public Waters Inventory, etc.).

This EA uses the NWI-MN to identify wetlands. The NWI-MN is a publicly available GIS database that provides information on the location and characteristics of wetlands in Minnesota. The inventory is a 2008 update of the USFWS National Wetlands Inventory that was completed for Minnesota in the 1980s. Wetlands listed on the NWI-MN may be inconsistent with local wetland conditions; however, the NWI-MN provides an accurate and readily available database of wetland resources within the land control area that can be used to identify wetlands at the solar facility. The wetland mapping using the NWI-MN identified 0 acres of wetlands within the land control area.[283] There are no PWI features mapped within the land control area.[284] There are no calcareous fens within the 1 mile project area radius.[285]

Birch Coulee Solar contracted with Barr Engineering and completed an onsite wetland delineation in July of 2023, delineating wetlands totaling approximately 26.3 acres within the land control area, approximately 2.5% of the project. The 26.3 acres make up a total of 18 palustrine emergent wetlands, most of which are within tilled agricultural fields that contained functional drain tile.[286] Correspondence with USACE and Renville County SWCD occurred to approve wetland delineation before the Site Permit Application was submitted.[287]

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

[283] 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

[284] SPA, p. 61.

[285] SPA, p. 62.

[286] SPA, pp. 61-62.

[287] SPA, Appendix H: Agency Correspondence.

Table 22[288] summarizes delineated wetlands within the area of land control, which were identified using GIS shapefiles provided from Birch Coulee Solar's documented wetland delineation.

Table 22. Delineated Wetlands

Wetland type	Acres in land control area
Seasonally flooded basin	25.4
Fresh (wet) meadow	0.9
Total	26.3

Potential Impacts

Although 26.3 acres of wetlands have been identified within the land control area, the preliminary layout for the solar facility avoids locating solar arrays and associated facilities in wetlands. However, there may be potential for temporary, short-term impacts to wetlands that occur during ground disturbing activities necessary for installing fences. Additionally, there may be potential for minimal long-term impacts if engineering constraints require installing fencing across some wetlands.

Mitigation

The project layout has been designed to avoid all wetlands delineated to date. If wetland impacts are required for the final layout, Birch Coulee Solar will obtain any necessary permits and coordinate with the appropriate agency, such as the USACE under Section 404 and 401 of the Federal Clean Water Act (CWA) and the Renville County SWCD under the Minnesota Wetland Conservation Act (WCA), prior to construction.[289]

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

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

[288] EA, Appendix C, Question 11.
[289] SPA, p. 62.

4.7.6 Vegetation

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

The solar facility is located in the North Central Glaciated Plains, Minnesota River Prairie (251Ba) subsection of the Prairie Parkland Province. This subsection consists of gently rolling ground moraine and is split in half by the Minnesota River valley. The area was historically extensive tall grass prairie with pockets of wet prairie throughout and scattered dry, dry-mesic, and dry gravel prairies. Floodplain forests of silver maple, elm, cottonwood, and willow grew along the Minnesota River and other streams. Fire was the most common natural disturbance before settlement; fire suppression has resulted in woodlands developing from oak openings or brush prairies. Upland prairie species are common throughout this subsection, but remnant stands of tallgrass prairie are rare, as the current land-use in the subsection is predominately agricultural.[290] The National Land Cover Database provides "spatial reference and descriptive data for characteristics of the land surface" nationwide.[291] The land cover within the project area is dominated by cultivated agriculture, with scattered areas of trees, native vegetation, and developed areas around roads and parcel boundaries.

Conservation Easements

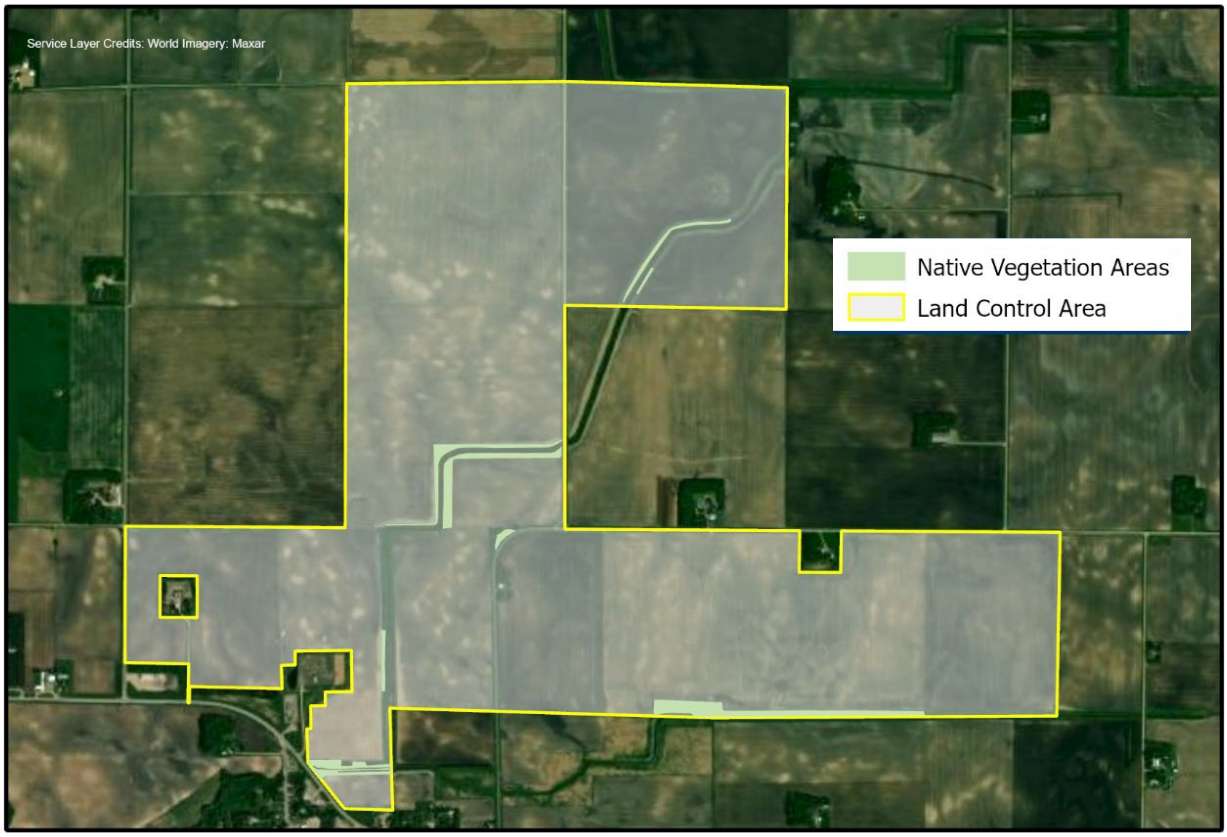
Participating landowners have enrolled lands adjacent to County Ditch 109A and Judicial Ditch 14-23 in the Conservation Reserve Program. These non-cultivated sections of native vegetation (Figure 35) harbor several native species, including but not limited to, Big Bluestem (*Andropogon gerardii*), Stiff Goldenrod (*Solidago rigida*), Side Oats Gama (*Bouteloua curtipendula*), and Whorled Milkweed (*Asclepias verticillate*).[292]

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

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

[292] SPA, p. 63.

Figure 35. Native Vegetation Within Project



Potential Impacts

Construction of the solar facility will eliminate vegetative cover and create impermeable surfaces at access roads, inverter skids, and laydown yards. Removal of vegetative cover exposes soils and could result in soil erosion. Temporary or permanent removal of vegetation also has the potential to affect wildlife habitat. Any tall growing woody vegetation in the preliminary development area will be removed. Agricultural land within the solar facility would be converted to perennial, low growing vegetative cover, resulting in a net increase in vegetative cover for the life of the project.

A low growing native prairie seed mix containing grasses, sedges, and wildflowers will be used under the arrays to provide vegetative cover without interfering with operations. Additional native prairie seed mixes that include grasses, sedges, and wildflowers will be used outside of the arrays; a short-height seed mix for areas within the fence line and a mixed-height seed mix for areas outside the fence line. The fence line will have its own seed mix consisting of low-growing, non-native fescues to create a perimeter that is less susceptible to fire and easier to control vegetation along. In wetland and stormwater management units, native seed mixes that contain plants well suited for soils

frequently becoming saturated will be used. Once established, vegetation would be maintained using best practice guidance from BWSR to meet the Habitat Friendly Solar standards.[293]

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

Conservation Easements

Construction within the native vegetation areas along County Ditch 109A and Judicial Ditch 14-23 could eliminate vegetative cover, exposing the soil and increasing erosion into the drainage system as well as removing wildlife habitat from the area. Several invasive plant species known for their rapid growth and competitive ability, including Canada Thistle (*Cirsium arvense*) and Reed Canary Grass (*Phalaris arundinacea*), were identified in the wetland and ditch-adjacent areas during the July 2023 wetland delineation.[294] Disturbance in the conservation easements along the ditches could result in the loss of native vegetative cover; allowing invasives present in the seed bank to rapidly establish and take over the vegetation corridors adjacent to the drainage ditches.

MITIGATION

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

- Section 4.3.17 requires the permittee to develop a VMP in coordination with state agencies and to file the VMP prior to construction. The applicant has prepared a draft VMP as Appendix F of the Site Permit application. The VMP must include the following:
    - Management objectives addressing short term (Year 0-3, seeding and establishment) and long term (Year 4 through the life of the permit) goals.
    - A description of planned restoration and vegetation management activities, including how the site will be prepared, timing of activities, how seeding will occur (broadcast, drilling, etc.), and the types of seed mixes to be used.
    - A description of how the site will be monitored and evaluated to meet management goals.
    - A description of the management tools used to maintain vegetation (e.g., mowing, spot spraying, hand removal, fire, grazing, etc.), including the timing and frequency of maintenance activities.
    - Identification of the third-party (e.g., consultant, contractor, site manager, etc.) responsible for restoration, monitoring, and long-term vegetation management of the site.
    - Identification of on-site noxious weeds and invasive species (native and non-native) and the monitoring and management practices to be utilized.

[293] SPA, Appendix F: Vegetation Management Plan.
[294] Id.

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

Prior to transporting to the project, Birch Coulee Solar will use rumble strips and designated cleaning areas to remove noxious weeds and/or seeds from equipment. The conservation easements along County Ditch 109A and Judicial Ditch 14-23 will be avoided as they fall within the setback distances from drainage ditches Birch Coulee Solar indicates they will follow. Additionally, Birch Coulee Solar has designed the project to avoid tree clearing.[295] Special permit condition Section 5.4, which requires compliance with Renville County setback requirements, provides additional assurance that the ditch-adjacent conservation easements will not be disturbed.

No additional mitigation is proposed.

4.7.7 Wildlife and Habitat

The ROI for non-avian terrestrial wildlife and their habitats is the land control area, the ROI for birds is the local vicinity, and the ROI for aquatic wildlife and their habitats is the area of the Minnesota River at the Purgatory Creek outlet. Potential impacts may be positive or negative and are species dependent. Long-term, **minimal to moderate** 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 to moderate**.

The project landscape is dominated by agriculture and developed areas (roads, homes, and farmsteads). Landscape types and vegetation communities vary throughout the local vicinity. Fencerows and ditches, as well as small pockets of wetlands and trees, provide habitat for terrestrial and avian wildlife. One mile south of the project, the Minnesota River provides habitat for aquatic wildlife.

[295] SPA, p. 63.

Wildlife utilizing the project area are common resident and migratory species associated with disturbed habitats and are accustomed to human activities (e.g., agricultural activities and road traffic) occurring in the area. Mammals, reptiles, amphibians, and insects are present. Species that may use habitats typical of land cover within the project area include:

- Mammals near agricultural areas such as white-tailed deer, mice, voles, raccoons, mammals nearer to woodland habitats such as bats, and opossum, and mammals such as muskrats possible near wetlands;
- Reptiles near plant diverse areas or wetlands such as garter and redbelly snakes, turtles, and skinks;
- Amphibians near agricultural, grassland, or wetland areas such as the northern leopard frog and American toads;
- A variety of insects including native bees, butterflies, and moths;
- Bird species near open fields and agricultural areas such as turkeys, pheasants, red- tailed hawks, grackles, meadowlarks, bobolinks, horned larks, and American kestrels;
- Waterfowl and shorebirds near wetlands areas such as mallards and red-winged blackbirds; and
- Common woodland bird species such as cardinals, chickadees, and nuthatches.

POTENTIAL IMPACTS

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

Non-Avian Terrestrial Wildlife

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

The largest impact to wildlife associated with solar facilities is fencing. Project fencing will be 7 ft-high chain link fences topped with a one-foot strand of high-tensile wire,[296] which is below the height recommended by the Minnesota DNR.[297] This may increase the risk of larger wildlife, such as deer, getting stuck within the facility; the presence of project components may hinder wildlife from reaching the speed necessary to clear the fence from the inside. Additionally, although deer can jump many fences, they can become tangled in both smooth and barbed-wire fences, especially if the wires

[296] SPA, p. 15.

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

are loose or installed too closely together.[298] Safely removing deer from solar facilities can be difficult due to their unpredictability. Predators can use fences to corner and kill prey species,[299] and fencing that directs wildlife onto roads can increase wildlife and motorist fatalities. However, fencing does not negatively impact all wildlife. Smaller animals who can move through fence openings may be protected within facility fences,[300] giving them a safe refuge for shelter or rearing their young.

Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact wildlife populations. Wildlife entanglement from plastic netting and other plastic materials has been documented in mammals and reptiles and can lead to injuries, such as lacerations or spinal damage, and even result in death due to strangulation or overheating.[301]

Birds

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

Risks to birds have been identified near PV solar facilities. Preliminary findings in one report, based on limited data, suspect a large expansive of reflective, blue panels may be reminiscent of a large body of water. Deemed the "Lake Effect Hypothesis", or LEH, the study suggests that migrating birds, confusing the solar facility with a body of water, attempt to land, consequently incurring trauma and related predation.[302] However, a separate study proposes that the LEH is a much more nuanced process; rather than a solar facility providing a signal of a lake to all aquatic birds at all times, only certain aquatic bird species are attracted to solar facilities, and this attraction is likely context-dependent. Water-obligate bird species in arid environments that lack water may be most susceptible to this "Lake Effect," as these species rely heavily on aquatic habitat to survive and reproduce.[303] Overall, utility-scale solar facilities have been found to have avian mortality rates that are notably

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

[299] 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.

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

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

[302] 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

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

lower than mortality caused by other human structures, including communication towers, vehicles, and buildings and windows.[304]

Birds are also susceptible to electrocution from transmission lines. Electrocution is a risk if the conductors or ground wires are close enough together that a bird can touch two conductors simultaneously with its wings or other body parts. Independent of the risk of electrocution, birds might be injured or killed by colliding with transmission line structures and conductors. The risk of collision is influenced by several factors including habitat, flyways, foraging areas, and bird size. Waterfowl, especially larger waterfowl such as swans and geese, are more likely to collide with transmission lines.

Plastic erosion control netting can also negatively impact bird populations. Both aquatic and terrestrial birds are susceptible to entanglement, experiencing injury, impaired mobility, and death.[305]

Aquatic Wildlife

There is limited aquatic habitat present within the land control area, but drainage systems within project boundaries extend the range of potential impacts to the Minnesota River. Construction and operation of the facility can create fugitive dust from soil movement or transportation on unpaved roads. Birch Coulee Solar has indicated they plan to use water or other dust control agents to suppress fugitive dust. Dust control agents used during construction frequently contain chloride, which can persist in the environment and accumulate to toxic levels. Chlorides readily spread through water systems and harm aquatic wildlife. Low concentrations of chloride exposure can impact growth, reproduction, and physiology, while high concentrations can result in death.[306]

Aquatic wildlife can be injured or killed by entanglement in plastic erosion control netting. Additionally, the use of erosion control methods containing plastic, such as plastic erosion control netting or hydro-mulch products with synthetic plastic fibers, can result in macro- or micro-plastic drainage into aquatic systems. Plastic pollution has consequences across aquatic trophic levels; it can be ingested by a variety of aquatic wildlife, impacting their growth and survival.[307]

Malachite green dye is commonly used in hydro-mulch erosion control products, and it can easily drain into aquatic systems. Malachite green dye has a wide range of negative toxicological effects on

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

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

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

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

aquatic wildlife, including, but not limited to, carcinogenesis, mutagenesis, respiratory toxicity, multi-organ tissue injury, and developmental abnormalities.[308]

Nocturnal Wildlife

The presence of pole-mounted lighting around the project perimeter fencing has the potential to interrupt the daily cycle of light and dark for animals in the project area. Exposure to artificial light at night impacts the physiology, behavior, and survival of a variety of wildlife: restricting their movement, impairing their foraging, inhibiting their communication, and even leading them to their death.[309] Light color can influence the impacts of nighttime artificial light exposure, with blue- and white-rich lighting having greater negative effects on wildlife, particularly to highly sensitive groups such as insects.[310]

Habitat

There are no Important Bird Areas (IBA) designated by the National Audubon Society within the land control area; the Upper Minnesota River Valley IBA is located approximately 0.5 miles south of the project and encompasses the Minnesota River Valley from Le Sueur to LacQui Parle Lake.[311] There are no Wildlife Management Areas, Waterfowl Production Areas, or other designated wildlife or habitat areas within the project area.[312]

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 herbaceous cover and native 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, grassland birds, reptiles, insects, etc. accustomed to human disturbance. A recent Minnesota study found that utility scale solar habitats with pollinator vegetation increased native bee abundance, resulting in increased pollination visits to bordering agricultural fields.[313] Solar habitat also enhances bird species richness and diversity in agricultural landscapes,[314] likely because these sites provide beneficial foraging and nesting habitat in a resource-limited landscape. The conversion of the land control area

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

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

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

[311] Audubon Minnesota, retrieved from: https://mn.audubon.org/node/4281.

[312] SPA, p. 64.

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

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

from agricultural to native vegetation will positively impact terrestrial wildlife within the land control area, as well as aquatic wildlife in Purgatory Creek and the Minnesota River, by reducing pesticide use.

The VMP anticipates that mowing will be done 1-2 times during the growing season over the first few years of the project. For long term maintenance, mowing or sheep grazing will be used to maintain vegetative health and prevent seed spray.[315]

Overall, the project does not contribute to significant habitat loss or degradation or create new habitat edge effects.

MITIGATION

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

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

Other potential mitigation measures include:

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

[315] SPA, Appendix F: Vegetation Management Plan.

The DSP (**Appendix B**) proposes special conditions related to the mitigating impacts to wildlife resulting from the project's adjacency to TH 19, bisection by CR 73, and connection to the Minnesota River via within-site drainage systems:

- Section 5.13 requires the permittee to apply a minimum setback of 67 feet from the perimeter fence to all road ROWs to reduce the risk of vehicle collisions with wildlife. This is in compliance with the Renville County setback requirements in Section 5.4.
- Section 5.14 requires the permittee to use motion activated, down-lit, shielded lighting around and within the Project and coordinate with MnDOT on Approved Products for Luminaries with respect to approved Uplight ratings and nominal color temperatures.
- Section 5.15 requires the permittee to use dust suppression agents that do not contain chloride.
- Section 5.16 requires the permittee to use erosion control materials that do not contain plastic or synthetic fibers or malachite green dye.

4.7.8 Rare and Unique Resources

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

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

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

The Division of Ecological and Water Resources within DNR manages the Natural Heritage Information System (NHIS). The NHIS "provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new information becomes available and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and conservation of these features."[316] NHIS data includes federally endangered, threatened, or candidate plant species, and endangered or threatened animal species. The system also includes state endangered, threatened, or special concern species. The NHIS database is a source of information,

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

but not the sole source for identifying these resources, as some areas surveys have not been conducted extensively or recently making.

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

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

Potential Impacts

Natural Communities

The MBS systematically collects, interprets, and provides baseline data on the distribution and ecology of rare plants, rare animals and native plant communities.[317] The MBS uses four classifications denoting the level of biological diversity to rank sites:[318]

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

There are no MBS sites of moderate, high, or outstanding biodiversity significance within the land control area. There are several MBS sites of moderate biodiversity significance 1 mile south of the project, one is an upland prairie system within the railroad ROW along Minnesota State Highway 19, and the others are fire-dependent and mesic hardwood forest systems scattered along the northern

[317] DNR. *Minnesota County Biological Surveys*, http://www.dnr.state.mn.us/eco/mcbs/index.html
[318] DNR, *Minnesota Biological Survey*, MBS Site Biodiversity Significance Ranks, https://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html.

side of the Minnesota River. There is one MBS site of outstanding biodiversity, the Cedar Mountain floodplain forest system, south of the project and across the Minnesota River.[319]

RARE SPECIES

Northern Long Eared Bat (Myotis septentrionalis)

The Northern Long Eared Bat (NLEB) is a federally listed species and state listed species of concern. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark or in cavities or crevices of both live and dead trees. The spread of white-nose syndrome across the eastern United States has become the major threat to the species. Activities that might impact this species include, but are not limited to, any disturbance to hibernacula and destruction or degradation of habitat including tree removal. While the land control area is primarily agricultural lands with little forested habitat, the NLEB is limited to shelterbelts or windbreaks. The USFWS determined the project is not likely to result in an incidental take of the NLEB.[320] According to the MNDNR and USFWS, there are no known hibernacula in Renville County or Redwood County, which is the adjacent southern county. The preferred mitigation strategy to avoid impacts to the NLEB is avoidance of tree-clearing to the extent possible. When tree clearing is necessary, it should be done outside the pup rearing season from June 1 to July 31 and outside the active NLEB season from April 1 to October 31.[321]

Tricolored Bat (Perimyotis subflavus)

The Tricolored Bat (TCB) is a proposed federally listed species and state listed species of concern. During the winter this species hibernates in caves, mines, and tunnels, and during the active season (approximately April-October) they generally roost singly in trees, rock crevices, and barns, but are also known to roost in their winter hibernaculum. Activities that might impact this species include, but are not limited to, any disturbance to hibernacula and destruction or degradation of habitat including tree removal. Disturbance to the hibernacula is particularly harmful to juveniles, who's reduced fat stores decrease their chances to survive the winter. The USFWS determined the project is not likely to adversely affect the TCB.[322] According to the MNDNR it has only been found in small numbers in the state and a maternity colony has yet to be found in Minnesota. The preferred mitigation strategy to avoid impacts to the TCB is avoidance of tree-clearing to the extent possible. When tree clearing is necessary, it should be done outside the active TCB season from April 1 to October 31.[323]

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

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[319] Minnesota Natural Resource Atlas, retrieved from https://mnatlas.org/gis-tool/.
[320] SPA, Appendix J: Protected Species Review Documentation.
[321] Minnesota DNR. *Rare Species Guide: Northern Long-eared Bat*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC01150
[322] SPA, Appendix J: Protected Species Review Documentation.
[323] Minnesota DNR. *Rare Species Guide: Tricolored Bat*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC03020

are common, including roadside ditches, open areas, wet areas, and urban gardens. Monarchs require milkweed plants for the completion of the immature lifecycle.[324] Due to the agricultural landscape, suitable monarch butterfly habitat is generally limited in the land control area. Whorled milkweed (*Asclepias verticillata*) was discovered in the native vegetation ditch-adjacent areas during the July 2023 wetland delineation study.[325] These areas are within the Renville County drainage ditch setbacks where Birch Coulee Solar plans to largely avoid vegetation removal, so removal of existing whorled milkweed is not anticipated. The USFWS determined the project will have no effect on the monarch butterfly.[326] All four native seed mixes designed for the project include at least one milkweed species;[327] once vegetation has been established the project can provide foraging habitat for monarchs.

Bald Eagles (Haliaeetus leucocephalus)

In Minnesota, the bald eagle nesting season is generally January through early July. Bald eagles are primarily found near rivers, lakes, and other waterbodies in remote and, more recently, within metropolitan areas.[328]

Bald eagles are afforded additional protections under the Bald and Golden Eagle Protection Act, which is administered by the USFWS. Bald eagle incidental take permits and nest removal permits are considered to be voluntary permits, meaning a project proposer must make the determination to pursue a permit based on the respective risk of their project's potential to take a bald eagle.

Bald eagles typically nest in mature trees near large lakes or streams. Nesting habitat suitable for bald eagles is not present within the land control area and the closest suitable nesting habitat is associated with the Minnesota River, approximately 1 mile south and southwest of the project.[329] The USFWS will coordinate appropriate mitigation measures for bald eagles for the project. Mitigation measure may include setbacks from nests, timing restriction for construction activities, and possibly seeking a USFWS permit for removal of a nest.

Prairie Bush Clover (Lespedeza leptostachya)

Prairie Bush Clover is a federally and state listed threatened species endemic to the upper Mississippi River Valley. The primary threat to the species is habitat loss, land conversion, and encroachment of non-native and invasive species. In the North Central Glaciated Plains section, populations typically occur on bedrock outcrop, mesic, and dry prairie slopes on sites that have coarsely textured loam or colluvium soils with high sand or gravel content. These remnant or isolated habitats are often slightly concave with mid-slopes or are unsuitable for cultivation. Prairie bush clover is a long-lived perennial, but seedling establishment is limited, and plants are slow growing. Plants flower from mid-July

[324] Minnesota DNR, *Monarch Butterfly*. Retrieved from: https://www.dnr.state.mn.us/insects/monarchbutterfly.html
[325] SPA, Appendix F: Vegetation Management Plan.
[326] SPA, Appendix J: Protected Species Review Documentation.
[327] SPA, Appendix F: Vegetation Management Plan.
[328] Minnesota DNR, *Bald Eagles in Summer*. Retrieved from: https://www.dnr.state.mn.us/birds/eagles/summer.html
[329] SPA, p. 58.

through early August, with fruiting running from August through September. This species is considered rare in its endemic range due to the loss and degradation of prairie habitat.[330] The USFWS determined the project will have no effect on prairie bush clover.[331] The probability of species occurrence within the land control area is considered to be low due to the heavy agricultural use and lack of native prairie habitat suitable for prairie bush clover.

Salamander Mussel (Simpsonaias ambigua)

The salamander mussel is a proposed endangered state listed species. It is widespread in Mississippi River drainages but is uncommon and rarely collected. The salamander mussel has strict habitat requirements, living only under flat rocks or ledges of rock walls in swift-flowing rivers or streams alongside mudpuppy salamanders, its glochidial host. They are long-lived animals that filter feed. Water and sediment pollution, invasive species, and dredging that increases siltation and physically alters habitat condition all threaten the salamander mussel's existence. The salamander mussel has been recorded in Chippewa and Nicollet Counties, northwest and southeast of Renville County along the Minnesota River, but it is currently restricted to the lower St. Croix River.[332]

TH 19: ROW Vegetation

The TH 19 ROW may contain State-listed threatened or endangered species in the same area as the western proposed/existing project access road (Figure 24).[333] Construction of the access roads could destroy State-listed species present in the ROW, and disturbances resulting from increased traffic and vehicle activity could result in further negative impacts. Road runoff, including exhaust and road materials, could spread from the large temporary laydown yard intended for project parking and equipment delivery to ROW vegetation. Highly sensitive species may experience impacts to fecundity or survival, resulting in localized population declines. This would be particularly impactful for species characterized by poor seed survival and slow growth, which may struggle to reestablish in the ROW.

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 B**) proposes special conditions related to the NLEB, the Bald Eagle, and the TH 19 ROW:

- Section 5.17 requires the permittee to comply with the USFWS guidance and requirements in effect regarding NLEB, including tree clearing restrictions if applicable.

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

[331] SPA, Appendix J: Protected Species Review Documentation.

[332] Minnesota DNR. *Rare Species Guide: Salamander Mussel*. Retrieved from: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV41010#

[333] MNDOT, Scoping Comments, October 24th, 2024, eDockets number: 202410-211275-01.

- Section 5.18 requires the permittee to file documentation authorizing any Bald Eagle nest removal prior to construction.
- Section 5.19 requires the permittee to comply with any MnDOT permit requirements deemed necessary by MnDOT's Office of Environmental Stewardship Protected Species Unit relating to vegetation in the TH 19 ROW.

No additional mitigation is proposed.

4.7.9 Climate Change

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

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

In 2020, the electricity sector was the second largest source of Minnesota GHG emissions at 15.8 million tons of 137 million tons, or 11.5%.[334] GHG from electricity generation have decreased by about 60% in Minnesota since 2005 due to a shift in generation to lower- and non-emitting sources and an increase in end-use energy efficiency.[335]

POTENTIAL IMPACTS

GENERAL

The MNDNR Minnesota Climate Trends Tool was used to determine current climate conditions for Renville County. Annual average temperature trends show a temperature increase of 0.19 °F per decade from 1895 to the present, and 0.48 °F per decade from 1970 to present. For precipitation,

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

total annual precipitation has increased at a rate of 0.30 inches per decade from 1895 to present, and a rate of 0.38 inches per decade from 1970 to present.[336]

The MNDNR Minnesota Climate Explorer tool was also used to project climate conditions for Renville County. Temperature models were created to project climate data for two scenarios, Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP is a measure adopted by the Intergovernmental Panel on Climate Change to represent various GHG concentration pathways. The numbers (i.e., 4.5 and 8.5) represent the amount of net radiative forcing the earth receives in watts per meter squared, where a higher RCP signifies a more intense GHG effect resulting in a higher level of warming. RCP 4.5 represents an intermediate scenario where emissions begin to decrease around 2040, and RCP 8.5 represents a scenario with no emissions reductions through 2100.[337]

The climate models predict that under RCP 4.5, the average temperature for Renville County is projected to increase by approximately 4 °F by Mid-Century (2040 to 2059) compared to current conditions (1980 to 1999). Late-Century (2080-2099) air temperature is projected to increase by approximately 6 °F for RCP 4.5, and approximately 10 °F for RCP 8.5. Mid-Century annual precipitation is projected to increase by approximately one-quarter inch for RCP 4.5. Late-Century annual precipitation is projected to increase by approximately one inch for RCP 4.5, and three inches for RCP 8.5.[338]

GREENHOUSE GASES

Construction activities will result in short-term increases in GHG emissions from the combustion of fossil fuels in construction equipment and vehicles. The project's construction emissions are estimated to be 1,298.14 metric tons of CO_2.[339] Additional GHG emissions will be created by land use change from the loss of existing natural carbon sinks in the area, estimated at 1,342.76 metric tons of CO_2.[340] The majority of land-use change emissions will occur during construction due to the change from cropland to settlement, however the establishment of perennial vegetation and prairie can reduce this impact. Altogether, the GHG emissions from construction are an insignificant amount relative to Minnesota's overall emissions of approximately 137 million tons in 2020.[341] 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

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

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

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

[339] Birch Coulee Solar, Application Completeness Reply Comments, August 23rd, 2024, eDockets number: 20248-209742-01.

[340] SPA, Appendix K: Greenhouse Gas Calculations.

[341] MPCA, *Greenhouse gas emissions data.* https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory

of the substation and switchyard. GHG emissions for project operation are estimated to be approximately 27.34 metric tons of CO_2 annually. Emissions are comprised of CO_2 from mobile combustion (7.66 tons) and electrical consumption (19.68 tons).[342]

If electrical energy from the project displaces energy that would otherwise be generated by carbon-fueled power plants (e.g., coal, natural gas), the project could reduce GHG by approximately 99,500 metric tons of CO_2 equivalent annually. Thus, compared to non-renewable energy generation, the project would be beneficial with respect to GHG emissions. Total GHG emissions resulting from construction and operation of the project are anticipated to be minimal when compared to the long-term reduction in GHG emissions facilitated by the project.

Climate and weather

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

Birch Coulee Solar used online climate screening tools to determine storm intensity impacts. The EPA Climate Resilience Evaluation and Awareness Tool anticipates an increase in 100-year storm intensity of 3.3 to 15.4 percent in 2035, and 6.4 to 29.9 percent in 2060 for the project area. Because of this, there is potential for waterways to be subject to more erosion. Periods of drought may also be possible. The EPA Streamflow Projections Map anticipates a change in average streamflow of the Minnesota River by a ratio of 1.14 (90^{th} percentile) under wetter conditions, and a ratio of 1.20 (10^{th} percentile) under drier conditions from 2071 to 2100 (RCP 8.5) compared to baseline historical flow (1976 to 2005).[343] Because the river is located approximately 1 mile south of the project, minimal impact from river flooding is anticipated.

A warming climate is expected to cause increased flooding, storms, and heat wave events. These events, especially an increased number and intensity of storms, could increase risks to the project. More extreme storms also mean more frequent heavy rainfall events, which can cause localized soil erosion or flooding. Climate and weather impacts are considered in the design of the facility and include impacts from extreme storms such as stormwater runoff, strong winds and hail. Birch Coulee Solar will develop and implement a construction SWPPP that considers storm events when designing permanent stormwater features such as retention ponds. Once site vegetation has established, the vegetative cover will reduce soil erosion into waterways. The deep roots of the prairie plants will allow for better water infiltration and reduce flooding risk. Birch Coulee Solar has designed their site seed mixes in consideration of future drought scenarios. Increased variability in temperature should not affect the establishment of the perennial vegetation.[344]

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[342] SPA, Appendix K: Greenhouse Gas Calculations
[343] SPA, p. 62.
[344] Id.

The FEMA National Risk Index[345] rates Renville County as having "very low" risk for hail and a "relatively high" risk for strong winds. Birch Coulee Solar has designed the project to withstand wind speeds up to 111 miles per hour and snow loads of 76 pounds per square foot. The tracking systems will be designed to withstand wind, snow, and seismic loads anticipated on site.[346]

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.

Birch Coulee Solar states that erosion during construction activities will be minimized through the implementation of the SWPPP, mitigating the additional erosion impacts due to the anticipated increase in 100-year storm intensity. Appropriate permits would be obtained prior to appropriating water during construction or operation, if needed.[347]

4.8 Electrical System Reliability

The proposed project will generate an annual average of approximately 264,000 megawatt hours (MWh) of renewable energy during its anticipated 30-year life span, enough to power approximately 25,142 homes per year.[348]

The project has been designed to minimize outages or interruptions to electrical service: SCADA equipment and the CMMS will be used to monitor facility operations 24/7, identify problems, and create preventative maintenance schedules to reduce the chance of equipment failure that results in service outages. The local operations and maintenance team will be supported by the remote O&M engineering and technical services teams (Section 2.1.5). Project components are designed to

[345] FEMA National Risk Index. https://hazards.fema.gov/nri/
[346] SPA, p. 62.
[347] SPA, p. 6.
[348] SPA, p. 1.

withstand extreme weather events (Section 4.7.9), and the tracking system allows the panels to follow the sun throughout the day, maximizing energy generation (Section 2.1.3.1).

The proposed project location is ideal for solar energy generation. The region receives a high degree of solar irradiance (Figure 29), and the flat terrain and lack of trees or tall structures means there is little potential for panel shading that impacts generation (Section 4.2). The proximity of the proposed solar facility to the Franklin 115 kV substation minimizes power loss over long transmission distances,[349] as only a short gen-tie line will be needed to interconnect to the grid.

Solar panels can generate electricity from both direct and diffuse, or indirect, solar radiation.[350] Diffuse solar radiation is sunlight that is absorbed, scattered, or reflected by atmospheric components such clouds.[351] Even on cloudy days, the proposed project will generate electricity to supply to the grid. The rotational tracking system allows panels to track the sun's position during winter, when the sun is at a lower angle in the sky, and panels can be rotated to prevent snow from building up on the panel surface.

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

4.9 Unavoidable Impacts

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

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

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

- Fugitive dust.
- Noise disturbance to nearby residents and recreationalists.
- Visual disturbance to nearby residents and recreationalists.
- Soil compaction and erosion.
- Vegetative clearing (loss of shelter belts).

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

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

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

- Disturbance and temporary displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed.
- Minor amounts of marginal habitat loss.
- Possible traffic delays.
- Minor GHG emissions from construction equipment and workers commuting.

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

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

4.10 Irretrievable or Irreversible Impacts

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

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

4.11 Resource Topics Receiving Abbreviated Analysis

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

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

4.11.1 Displacement

Displacement can occur when residences or other buildings are located within a proposed site or right-of-way. If the buildings would potentially interfere with the safe operation of a project, they are typically removed from the site or ROW and relocated. Displacements from large energy facilities are

rare and are more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible than in rural areas where there is more room to adjust site boundaries or ROWs to accommodate the proposed energy facility.

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

4.11.2 Communications

Electronic interference from the proposed project is not anticipated. The project area is served by 9 AM radio stations, 23 FM radio stations, and 3 digital television channels. There are no radio, microwave, or television towers are located within the boundary of the solar facility. There are no cell phone towers located within the land control area; the closest cell tower is 4.4 miles west of the project area. Cellular phone service in the service area is provided by national operators.

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

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

4.11.3 Implantable Medical Devices

Electromagnetic fields (EMF) might interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Impacts to implantable medical devices and persons using these devices are not expected to occur, but, if they did occur, moving away from the project would return the pacemaker to normal operation. Section 4.3.30 of the DSP requires the permittee to provide educational materials about the project to adjacent landowners. Additional mitigation is not proposed.

4.11.4 Forestry

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

4.11.5 Mining

There are no mining operations within the area of land control. The closest aggregate pit is located 7.5 miles northwest of the project, and the closest rock quarry is location 4 miles west of the project.

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.

4.11.6 Topography

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

4.12 Cumulative Potential Effects

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

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

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

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

4.12.1 Analysis Background

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

Cumulative potential effects are impacts to the environment that results from "the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects."[352] 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.

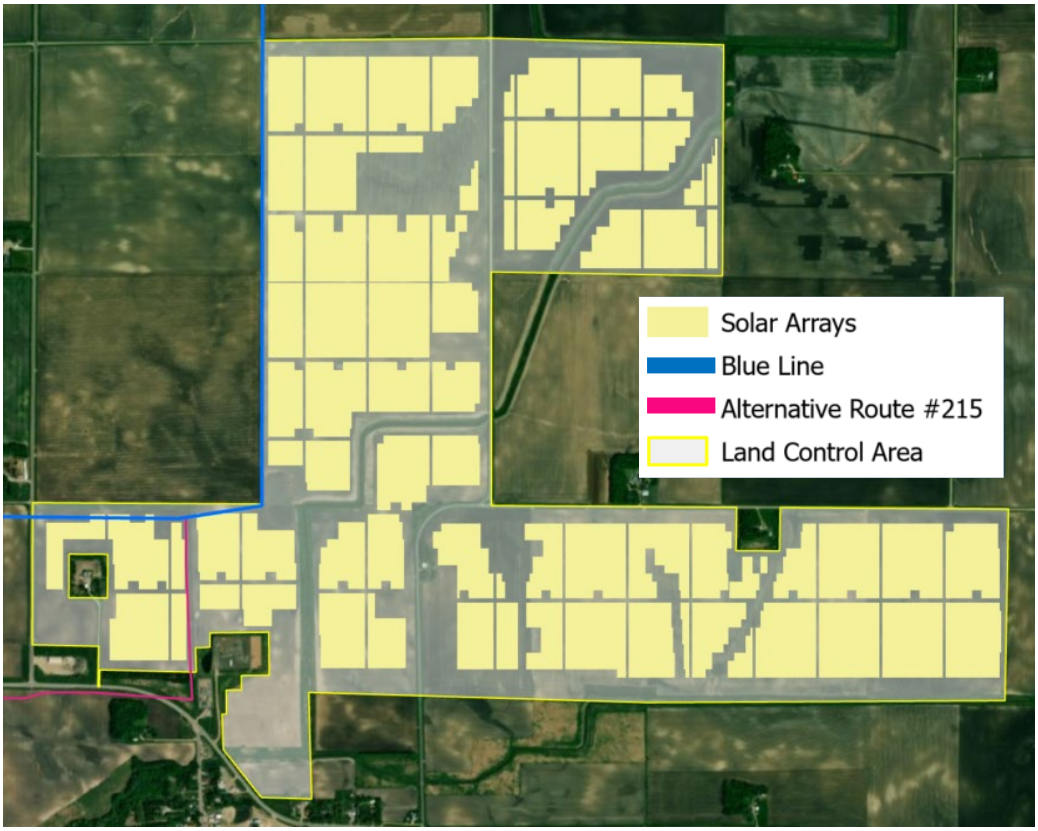
Birch Coulee Solar contacted city, township, and county representatives about future projects within the area. Birch Coulee Solar also used the Renville County and MnDOT websites, along with the

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

Environmental Quality Board's interactive project database,[353] to identify foreseeable projects. One future project was identified from publicly available resources, and no additional future projects were identified from their communication with LGU representatives.[354]

The one future project within the environmentally relevant area is Minnesota Energy Connection (MNEC). Xcel Energy has applied for a Route Permit to construct a 345 kilovolt (kV) connection between the existing Sherburne County Generation Station Substation in Becker, Minnesota, and a new substation near the Town of Garvin in Lyon County, Minnesota.[355] Xcel Energy has proposed two routes: the Purple Route and the Blue Route. The Blue Route runs adjacent to the project from the northwestern end of the project towards the south, then heads west parallel to 660th Avenue along the northern fence line of the westernmost section of the project. Alternative Route #215 would cross north-south over the westernmost section of the project, to run parallel to TH 19 instead of 660th Avenue (Figure 36).

Figure 36. Minnesota Energy Connection Routes Within Project Area



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

[354] SPA, pp. 64-65.

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

Cumulative effects are discussed here for projects that are reasonably foreseeable in the next five years in the project area. The proposed construction start date for MNEC is in the third quarter of 2025.[356] Birch Coulee Solar does not anticipate starting construction for the project until 2028 or later.[357] Construction schedules are not anticipated to overlap; if they do, potential cumulative impacts include increased noise levels and traffic delays and reroutes. It is assumed that the majority construction-related impacts of these projects are short-term. The discussion here is focused on the potential long-term impacts of these projects, thus, this section largely focuses on operational impacts, with a few longer-term construction-related impacts included.

Where cumulative effects are anticipated, a written description is provided. Where cumulative potential effects are not anticipated no further analysis is provided. For the purposes of this EA, actions that have occurred in the past and their associated impacts are considered part of the existing environmental and were analyzed in this section. The described potential impacts from MNEC in the following sections were sourced from the project's Environmental Impact Statement.[358]

4.12.2 Human Settlement

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

AESTHETICS

The Birch Coulee Solar project and MNEC will both result in aesthetic impacts (Section 4.3.1). New transmission lines and the solar facility will introduce new visual elements into the landscape. Thus, aesthetic impacts will increase in the project area as a result of these future projects.

SOCIOECONOMICS

While construction of the Birch Coulee Solar project and MNEC will generate construction related jobs, the projects are not anticipated to create significant numbers of long-term jobs (Section 4.3.8). The increase in energy projects in the area may increase tension in the project area between renewable energy and rural character.

NOISE

Construction of both projects will create increased noise, through vehicle activity and construction. Once operational, noise from the Birch Coulee Solar Project is anticipated to be negligible (Section 4.3.2); noise coming from the inverters, transformer, and tracking system will dissipate, falling well below L_{50} dBA standards at the nearest resident. Operational noise from MNEC is anticipated to be

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

[357] Birch Coulee Scoping Comments, October 25th, 2024, eDockets number 202410-211314-01.

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

inaudible. Weather conditions such as strong wind or rain may temporarily increase noise from both projects, but levels are anticipated to be below L_{50} dBA standards and will be of a short-term duration.

PROPERTY VALUES

Property values may be affected at homes within 0.5 miles of the Birch Coulee Solar project compared to homes 2-4 miles away, with a potential reduction in home sale prices of approximately 4% (Section 4.3.5). MNEC may negatively impact property values depending on how the transmission line affects property aesthetics and if potential buyers have concerns over EMF. Residences within the local vicinity might see both the solar facility and the transmission line in their viewsheds. The overall impact intensity level is anticipated to dissipate with distance. Because of the uncertainty associated with property value impacts, potential impacts to specific properties could be moderate to significant.

4.12.3 Public Health and Safety

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

ELECTROMAGNETIC FIELDS

EMF generated by the Birch Coulee Solar project is not anticipated to negatively impact human health (Section 4.4.2). MNEC will be constructed to maintain proper safety clearances, and negative impacts to human health from EMF exposure is not anticipated. The overall impact intensity is anticipated to be negligible to minimal.

TRANSPORTATION

MNEC's Alternative Route #215 crosses through the TH 19 ROW section that contains MnDOT's living snow fence.[359] Pole placement has not been determined; if the final design includes a pole within the vicinity of the snow fence, any vegetation removal or alteration during construction could impair the snow fence function. Construction of the Birch Coulee Solar project could also impair snow fence function through vegetation removal or alteration. Cumulative damage to the living snow fence from construction of both projects could intensify blowing snow risk along this section of TH 19, reducing visibility and increasing crash and spinout rates and corresponding human safety risks.

Depending on the extent of the cumulative damage, the time required for vegetation establishment to restore the living snow fence may be lengthy, creating a long-term impact. Birch Coulee Solar has indicated that their project design avoids vegetation alteration or removal within the area containing the snow fence, therefore, they do not anticipate impacting the snow fence and increasing human health risks.[360] The final route for MNEC has yet to be selected. However, even if Alternative Route #215 is selected, significant damage to the snow fence is not expected to occur. Standard transmission line route permit conditions require applicants to preserve MnDOT ROW features, such as snow

[359] MNDOT, Scoping Comments, October 24th, 2024, eDockets number: 202410-211275-01.
[360] Birch Coulee Solar, Response to Scoping Comments, November 6th, 2024, eDockets number: 202411-211682-01.

fences, to the maximum extent practicable. Thus, pole placement that would require removal or alteration of the vegetation making up the living snow fence is unlikely. While there is potential for moderate impacts to human safety if the living snow fence is damaged, project design and ROW management permit conditions reduce the likelihood of this occurring. Thus, the overall impact intensity is anticipated to be negligible to minimal.

4.12.4 Land-based Economies

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

AGRICULTURE

The loss of agricultural land from the Birch Coulee Solar project will be mitigated by lease payments (Section 4.5.1). MNEC may negatively impact agricultural land if the transmission line structures impede the use of farm equipment or otherwise impair agricultural operations. The segments of the Blue Route and Alternative Route #215 that cross through the project are short; the footprint of agricultural land that may be affected by transmission line structures is small. The overall impact intensity is anticipated to be minimal.

4.12.5 Archaeological and Historical Resources

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

4.12.6 Natural Resources

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

AIR QUALITY

The Birch Coulee Solar will generate negligible fugitive dust and exhaust emissions during operation (Section 4.7.1). Transmission lines from MNEC will produce minimal amounts ozone and nitrous oxide through the corona effect. The overall impact intensity level from these projects is expected to be negligible to minimal.

WILDLIFE

Components of the Birch Coulee Solar project such as PV panels and fencing will create a collision, entanglement, and funneling risk for wildlife (Section 4.7.7). Transmission line structures from MNEC present a collision or electrocution risk for birds. The transmission line segments in the project will be a slight increase in the electrical equipment footprint in the project area. The overall impact intensity level is anticipated to remain minimal to moderate.

4.12.7 Rare and Unique Resources

Cumulative potential effects on rare and unique natural resources are uncertain and difficult to determine. One cumulative potential effect has been identified; the impact intensity level is anticipated to be negligible to minimal. This impact has the potential to reach a moderate intensity level, but standard permit conditions make this unlikely.

RARE SPECIES

Overall, there are relatively few rare and unique species in the project area (Section 4.7.8). The section of TH 19 ROW near the western proposed and existing access roads for the Birch Coulee Solar project may contain State-listed threatened and endangered species. MNEC's Alternative Route #215 also crosses through this area. If Alternative Route #215 is selected and transmission line poles are placed in the ROW, State-listed species could be harmed or removed during construction. Negative impacts to State-listed species could result from vehicle activity on Birch Coulee Solar's proposed access road adjacent to the ROW, elevating impact intensity levels to moderate. Depending on the severity of harm to State-listed species, the time required for species to reestablish in the ROW may be lengthy, creating a long-term impact.

Standard transmission line route permit conditions require applicants to minimize impacts to vegetation, and MNEC has made additional commitments to minimize impacts to State-listed species and other rare and sensitive resources. Pole placement within this ROW, if the presence of State-listed species is confirmed, would be unlikely to occur. Rather, routing would be designed to span the area containing State-listed species. While there is potential for moderate impacts to rare species from the cumulation of construction within the ROW and increased traffic along it, permit conditions and project commitments reduce the likelihood of this occurring. Thus, the overall impact intensity is anticipated to be negligible to minimal.

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