Site Permit Application to the Minnesota Public Utilities Commission

Birch Coulee Solar LLC ● Birch Coulee Solar Project
Renville County, Minnesota

July 2024

Docket Number IP7119/GS-23-477

Project Name:	Birch Coulee Solar Project
Project Location:	Renville County, Minnesota
Applicant:	Birch Coulee Solar LLC
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Abbreviations

AADT	Average Annual Daily Traffic
AES	AES Clean Energy
AIMP	Agricultural Impact Mitigation Plan
AM	Amplitude Modulation
ARMER	Allied Radio Matrix for Emergency Response
ASIS	Aggregate Source Information System
AQI	Air Quality Index
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BWSR	Board of Water and Soil Resources
CAA	Clean Air Act
CFS	carbon-free standards
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibel scale
DC	direct current
DNR	Minnesota Department of Natural Resources
DOC-EERA	Minnesota Department of Commerce, Energy and Environmental Review and Analysis
DOT	Minnesota Department of Transportation
DWSMA	Drinking Water Supply Management Area
ECS	Ecological Classification System
EJ	Environmental justice
EMF	electric and magnetic fields
EPC	engineering, procurement, and construction
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	Frequency Modulation
GHG	greenhouse gas
GIA	Generator Interconnection Agreement
GIS	Geographic Information System
GW	gigawatt
IPaC	Information for Planning and Conservation
kV	kilovolt
kV/m	kilovolts per meter
LEPGP	Large Electrical Power Generating Plant
MBS	Minnesota Biological Survey
MBTA	Migratory Bird Treaty Act
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
mG	milligauss
MIAC	Minnesota Indian Affairs Council

MISO	Midcontinent Independent System Operator
MPCA	Minnesota Pollution Control Agency
MW	megawatt
MWac	megawatt alternating current
MWh	megawatt hour
MWI	Minnesota Well Index
NAAQS	National Ambient Air Quality Standards
NAC	noise area classification
NEC	National Electric Code
NESC	National Electrical Safety Code
NHIS	Natural Heritage Information System
NHR	Natural Heritage Review
NIEHS	National Institute of Environmental Health Services
NOAA	National Oceanic and Atmospheric Administration
NPC	native plant community
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O&M	Operation and Maintenance
OSA	Office of the State Archaeologist
POI	Point of Interconnection
PPA	power purchase agreement
Project	Birch Coulee Solar Project
PUC	Minnesota Public Utilities Commission
PV	photovoltaic
PWI	Public Water Inventory
RCP	Representative Concentration Pathway
RES	renewable energy standards
RIM	Reinvest in Minnesota
SBS	Sites of Biodiversity Significance
SCADA	Supervisory Control and Data Acquisition
SECS	Solar Energy Conversion System
SES	solar energy standards
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SNA	Scientific Natural Area
SPCC	Spill Prevention, Control, and Countermeasure
SSA	sole source aquifer
SSURGO	Soil Survey Geographic database
SWPPP	Stormwater Pollution Prevention Plan
TCS	Traditional Cultural Specialist
THPO	Tribal Historic Preservation Office
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VMP	Vegetation Management Plan
WCA	Wetland Conservation Act

WHO	World Health Organization
WMAs	Wildlife Management Areas

1 Introduction

Birch Coulee Solar LLC (Birch Coulee Solar), an affiliate of AES Clean Energy (AES), is proposing to construct, own, and operate the Birch Coulee Solar Project (Project). AES owns and operates solar, battery, wind, and green hydrogen projects across the United States, grossing 6.9 gigawatts (GWs) in operation at the end of 2023. The Project will be the first solar project developed in Minnesota for an AES affiliate. AES is a division of The AES Corporation based in the United States and a publicly traded Fortune 500 company. The AES Corporation has projects spanning 13 other countries over four continents. The Project is an up to 125-megawatt alternating current (MWac) photovoltaic (PV) solar energy generating facility and associated infrastructure in Renville County, Minnesota (Map 1). Birch Coulee Solar proposes to build the Project, including a 115 kilovolt (kV) generation interconnect (gen-tie) line less than 500 feet long, within an area of approximately 1,041.6 acres of private land (Site), of which 768.2 acres will be for the operation of the Project (Anticipated Development Area). The Project is within Birch Cooley, Camp, and Bandon townships and the city of Franklin in Renville County, Minnesota. Birch Coulee Solar respectfully submits this permit application (Application) to the Minnesota Public Utilities Commission (PUC) for a Site Permit pursuant to the Minnesota Power Plant Siting Act (Minnesota Statutes (Minn. Stat.), § 216E) and Minnesota Rules (Minn. R.), Ch. 7850. Appendix A includes a completeness checklist for the Application.

Birch Coulee Solar submitted a notice to the PUC on May 23, 2024, of its intent to request a review of the Application under the alternative review process pursuant to Minn. Stat., § 216E.04, subd. 2(8) and Minn. R. 7850.2800 to 7850.3900.

Birch Coulee Solar submitted a request on April 3, 2024, for a solar energy generating system size determination to the Minnesota Department of Commerce, Energy and Environmental Review and Analysis (DOC-EERA) division in accordance with Minn. Stat., § 216E.021 (Appendix B). The DOC-EERA responded on April 12, 2024 (Appendix B).

1.1 Purpose

The purpose of the Project is to generate an annual average of approximately 264,000 megawatt hours (MWh) of renewable energy over its anticipated 30-year life, which equates to enough power for approximately 25,142 houses per year (reference (1)).

The Project will support the state of Minnesota's carbon-free standards (CFS), renewable energy standards (RES), and solar energy standards (SES) detailed in Minn. Stat. § 216B.1691, subd. 2g which requires Minnesota utilities to generate or procure sufficient energy equivalent to 100% of their retail energy sales by 2040, as well as setting other interim renewable energy and solar energy targets. As such, the Project will support the state's growing demand for renewable energy and for utilities, independent power purchasers, and corporations seeking to use renewable energy for business growth. In addition, the Project will diversify electricity sources, address environmental concerns, and meet anticipated growth in electrification (e.g., vehicles, heating, etc.). The Project will also benefit the local community through investment in construction spending, operation of the Project, property and business taxes, and landowner lease payments.

Birch Coulee Solar requested a Network Resource Interconnection Service with Midcontinent Independent System Operator (MISO) identified as J2087 for 125 megawatts (MWs). MISO is an independent, not-for-profit organization that delivers electric power across 15 states. Approval from MISO is necessary to connect the Solar Facility to the electrical transmission system. Birch Coulee Solar

entered the Interconnection Request for J2087 into the MISO Queue in 2021 for the Xcel Energy Franklin Substation. Per the latest MISO Definitive Planning Phase Schedule (7/1/2024), Birch Coulee Solar expects to sign the Generator Interconnection Agreement (GIA) with MISO and the interconnecting transmission provider, Northern States Power Company, a Minnesota corporation, in March 2025.

Birch Coulee Solar is working towards securing a Power Purchase Agreement (PPA), Build Transfer Agreement, Development Transfer Agreement, or other enforceable offtake agreements to sell the electricity, Renewable Energy Certificates, and capacity generated by the Project. The energy generated by the Project will be offered for sale to wholesale customers, including Minnesota utilities and cooperatives that have identified a need for additional renewable energy and capacity, and commercial and industrial customers that have set clean energy goals.

1.2 Applicant Information

Birch Coulee Solar authorizes the following individuals to receive communications related to this Application:

Birch Coulee Solar LLC:	Scott Groux, Developer, MISO Telephone: 801-696-5981 Email: scott.groux@aes.com 2180 S 1300 E Suite 500 Salt Lake City, Utah 84106
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The permittee for the Site Permit will be:

Birch Coulee Solar LLC:	Jordan Levin, Senior Director, Development – MISO Telephone: 800-579-7734 Email: jordan.levin@aes.com 2180 S 1300 E Suite 500 Salt Lake City, Utah 84106

1.2.1 Ownership at Time of Filing

Birch Coulee Solar LLC (Birch Coulee Solar), a Delaware limited liability company, will construct, own, operate, and maintain the Project. Birch Coulee Solar is an independent power producer and an affiliate of The AES Corporation. Birch Coulee Solar is qualified to do business in Minnesota.

Although not planned at this time, Birch Coulee Solar reserves the right to sell or assign the Project to another qualified entity at any time before, during or after the Project is operational. A transfer of the Site Permit requires PUC approval. Any future buyer or assignee must comply with the Site Permit conditions and land contracts. Land contracts in the form of solar lease or purchase option agreements are in place with nine private landowners in the Site, where 49.6% of the Site acreage will be purchased, and 50.4% of the Site acreage will be leased. Landowners participating in the Project currently use their land for agricultural purposes. Under the lease agreements, land will return to underlying landowners at the end of the operational lifespan of the Project. A full list of participating landowners is provided in Appendix C.

1.2.2 Proposed Ownership after Commercial Operations

Birch Coulee Solar plans to own, operate, and maintain the Project following the start of commercial operations.

1.3 Project Schedule

Table 1-1 summarizes the estimated schedule for the Project assuming a commercial operations date of 2028. The final schedule depends on permitting timelines, completion of PPA arrangements, and availability of required materials.

Table 1-1 Estimated Project Schedule

Activity	Description	Schedule
Interconnection	Approval from MISO to connect the Project to the grid and signed GIA.	GIA expected to be signed in March 2025
Land acquisition	Secure land rights necessary to develop the Project.	Completed
Site Permit	Subject of this Application.	Q2 2025
Other permits	Additional local, state, and federal, permits (as required).	Prior to construction
Equipment procurement and contractor selection	Purchase the equipment necessary for construction of the Project. Select the contractor that will construct the Project.	2025-2026
Construction	Construct the Project (e.g., arrays, substation, and gen tie line).	2027-2028
Testing and Commissioning	Confirm operability of equipment and prepare for operations.	2027-2028
Commercial Operations Date	Date the Project is officially operable.	2028

2 Potentially Required Project Permits and Approvals

2.1 Certificate of Need for Solar Facilities

A Certificate of Need is required for a "large energy facility," defined in Minn. Stat. § 216B.2421 as: "any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system."

The Project meets the definition of a large energy facility but does not require a Certificate of Need per the exemption provided in Minn. Stat. § 216B.243, subd. 8(a)(7). This exemption applies to any "solar energy generating system, as defined in Minn. Stat. § 216E.01, subdivision 9a, for which a Site Permit application is submitted by an independent power producer under Minn. Stat. § 216E or 216F." Birch Coulee Solar is an independent power producer and therefore a Certificate of Need is not required for the Project.

2.2 Site Permit for Solar Facilities

The Project meets the definition of a Large Electric Power Generating Plant (LEPGP) as defined in the Power Plant Siting Act and requires a Site Permit from the PUC prior to construction. In accordance with Minn. Stat. § 216E.04, subd. 2(8), Birch Coulee Solar seeks a site permit for the Project under the alternative review process provided for under Minn. Stat. § 216E.04 and Minn. R. 7850.2800-7850.3900. The Applicant filed a Notice of Intent to Submit a Site Permit Application under the Alternative Permitting Process to the PUC on May 23, 2024.

2.3 Certificate of Need and Route Permit for Transmission Line

The Certificate of Need Statute Minn. Stat. § 216B.243, subd. 2, states that "[n]o large energy facility shall be sited or constructed in Minnesota without the issuance of a Certificate of Need by the Public Utilities Commission..." In Minn. Stat. § 216B.2421, subd. 2(3), a large energy facility is defined as "any high-voltage transmission line with a capacity of 100 kV or more with more than ten miles of its length in Minnesota."

The Route Permit Statute Minn. Stat. § 216E.01, subd. 4 defines a high voltage transmission line requiring a route permit as "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."

The proposed 115 kV gen-tie line between the Project Substation and the utility-owned switchyard that will connect to the Franklin Substation is less than 500 feet long and therefore, neither a Certificate of Need nor a Route Permit are required.

2.4 Additional Permits and/or Approvals

The Project will require additional permits and/or approvals beyond the Site Permit. Birch Coulee Solar will obtain required permits and/or authorizations, as well as applicable licenses, prior to construction activities. Table 2-1 summarizes the additional potential permits, reviews, and consultations for the Project.

Table 2-1 Additional Potential Permits, Reviews, and Consultations

Regulatory Authority	Permit/Authorization	Need or Description	Status and Timing
FEDERAL			
U.S. Army Corps of Engineers (USACE) - St. Paul District	Section 404 Clean Water Act (CWA) permit	Dredging and/or filling Waters of the U.S.	Project layout currently avoids impacts to jurisdictional waters; therefore, a Section 404 permit is unlikely.
U.S. Fish and Wildlife Service (USFWS)	USFWS coordination under Section 7 or Section 10 of the Endangered Species Act (ESA)	Required if potential impacts to federally endangered or threatened species may occur.	Likely not necessary as suitable habitat for federally endangered or threatened species is absent or is not anticipated to be disturbed, but will occur prior to construction if necessary.
Federal Aviation Administration (FAA)	Determination of No Hazard to Air Navigation (Form 7460-1 Notice of Proposed Construction or Alteration)	Required if Project features are above 200 feet tall or within the 100:1 notification surface area.	The Project is outside of the notification area. Likely not necessary, but will confirm height of equipment closer to construction.
U.S. Environmental Protection Agency (USEPA)	Spill Prevention, Control, and Countermeasure (SPCC) Plan	Plan required where oil storage of 1,320 gallons or more occurs.	Birch Coulee Solar will prepare an SPCC plan prior to construction for construction-related fuel storage and prior to operation for operation-related fuel storage that exceeds applicability thresholds.
STATE			
Minnesota Department of Agriculture (MDA)	Agricultural Impact Mitigation Plan (AIMP)	Identify measures that the Project will take to avoid and/or repair potential negative agricultural impacts that may result from the construction, operation, and eventual decommissioning of the Project.	AIMP developed in consultation with MDA (Appendix D).
Minnesota Pollution Control Agency (MPCA)	Section 401 Water Quality Certification	Required when obtaining Section 404 Individual or Nationwide Permits.	Likely not necessary because Project layout currently avoids impacts to jurisdictional waters.
	Construction Stormwater General Permit, MNR100001	Construction activity exceeding one acre.	Birch Coulee Solar will submit a Notice of Intent for coverage under the General Permit prior to construction.
	Storage tank registration	Required for back-up generator aboveground storage tank if exceeding 500 gallons and underground storage tanks exceeding 110 gallons.	Will occur prior to construction if required.

Regulatory Authority	Permit/Authorization	Need or Description	Status and Timing
	State Air Registration Permit (if selected backup generators do not qualify for an exemption)	Required for backup generators if they do not qualify for an exemption.	Will occur prior to construction if required.
Minnesota Department of Natural Resources (DNR)	Consultation and review of state threatened and endangered species and/or take permit	Potential impacts to state-protected species.	Initiated and discussed in Section 4.5.8.
	General Permit 1997-0005 for Temporary Water Appropriations	Required if construction dewatering is greater than or equal to 10,000 gallons per day or 1 million gallons per year.	Birch Coulee Solar will apply if anticipated construction dewatering exceeds the threshold quantities.
	Public Waters Work Permit	Work in public waters.	Not necessary, as there are no Public Waters in the Site.
Minnesota Department of Administration and State Historic Preservation Office (SHPO)	Coordination regarding the identification of Cultural and Historical Resources	To inform the Site Permit process and impact analysis.	Obtain concurrence on Phase I inventory prior to construction. Initiated and discussed in Section 4.4.
Minnesota Department of Transportation (DOT)	Right-of-way permits and access driveway permits for DOT roads; oversize/overweight permit for state highways	If oversize / overweight equipment use will occur on DOT roads Includes one driveway permit off MN Highway 19.	The contractor will obtain permits as necessary prior to construction.
Minnesota Department of Health (MDH)	Well construction permit	Installation of a water supply well.	Birch Coulee Solar will obtain prior to construction, if applicable.
Minnesota Department of Labor and Industry	Request for electrical inspection	Necessary to comply with state electrical codes.	Inspection to be conducted after installation of electrical equipment during construction and prior to operation.
LOCAL			
Renville County Soil and Water Conservation District	Wetland Conservation Act (WCA) Approval	Birch Coulee Solar anticipates that wetlands regulated under WCA will be exempt. If impacts are necessary for access, Birch Coulee Solar will submit a joint permit application.	Birch Coulee Solar will obtain prior to construction, if applicable.
Renville County (and/or the Townships of: Birch Cooley, Bandon, and/or Camp);City of Franklin	Work permits and/or licenses	Miscellaneous permits.	The contractor will obtain permits as necessary prior to construction.
Renville County (and/or the Townships of: Birch Cooley, Bandon, and/or Camp); City of Franklin	Access driveway permits, Oversize weight permit	Driveway permits for access off county and local roads. If oversize weight equipment use will occur on county, township, or city roads.	The contractor will obtain permits as necessary prior to construction.

3 Project Information

3.1 Location

The Project is primarily in Camp, Birch Cooley, and Bandon Townships, Renville County, Minnesota; a portion of the Project is in Franklin, Minnesota (Map 1, Table 3-1). Map 2 shows participating parcels; Birch Coulee Solar obtained leases or has purchase options for each of the parcels within the Site. Appendix C provides a list of landowners.

Table 3-1 Project Location

Location	Township	Range	Section(s)
Camp Township	112N	33W	6
Birch Cooley Township and city of Franklin	112N	34W	1, 2
Bandon Township	113N	33W	31
Birch Cooley Township	113N	34W	36

The Project is within the area referred to throughout this Application as the Site. The "Anticipated Development Area" is a smaller area contained within the Site, and is the anticipated area required to operate the Project (Table 3-2, Map 3). In other words, the Anticipated Development Area is the operational footprint of the Project, and the areas outside of it but within the Site may be necessary only for temporary construction workspace.

Table 3-2 Site and Anticipated Development Area Acreages

Term Used in Application	Total Acres
Site	1,041.6
Anticipated Development Area	768.2

3.2 Site Selection and Constraints Analysis

Birch Coulee Solar's criteria for selecting the Project location was based on:

- Availability of a Point of Interconnection (POI)
- Sufficient solar resources
- Local landowner willingness to participate in the Project
- Proximity to existing electrical infrastructure
- A developable area that is relatively flat with few sensitive resources

Birch Coulee Solar's process for identifying a substation included analyzing previous queue filings, proposed interconnection improvements, and current technical specification of current interconnection infrastructure. Birch Coulee Solar identified Xcel Energy's existing Franklin 115 kV Substation as having available capacity. Birch Coulee Solar chose the Site over others for its proximity to the POI, interest from participating landowners, and no competition with other potential renewable energy projects (i.e., available land not currently participating in other renewable energy projects).

Birch Coulee Solar also screened the area for development constraints (e.g., geotechnical risks, steep topography), habitat for endangered species, proximity to culturally sensitive areas, and other potential environmental risks (e.g., pollutants, flood zones, current land use conflicts). Upon completion of the screening, Birch Coulee Solar approached landowners to negotiate voluntary agreements.

3.2.1 Prohibited and Exclusion Sites

Minn. R. 7850.4400, subp. 1 prohibits power generating plants in the following locations:

- National parks; national historic sites and landmarks
- National historic districts; national wildlife refuges
- National monuments; national wild, scenic, and recreational riverways
- State wild, scenic, and recreational rivers and its land use districts
- State parks
- Nature conservancy preserves
- State scientific and natural areas (SNAs)
- State and national wilderness areas

None of these prohibited sites is within the Site (Map 4). In addition, Minn. R. 7850.4400, subp. 3 specifies the following exclusion areas unless there is no feasible and prudent alternative:

- State registered historic sites
- State historic districts
- State Wildlife Management Areas (WMAs)
- County parks
- Metropolitan parks
- Designated state and federal recreational trails
- Designated trout streams
- State water trails

None of these exclusion sites is within the Site (Map 4).

Subject to certain exceptions, Minn. R. 7850.4400, subp. 4 prohibits LEPGPs on more than 0.5-acre of prime farmland per MW of net generating capacity unless there is no feasible and prudent alternative (prime farmland exclusion rule). Given the up to 125 MWac net generating capacity of the Project, the prime farmland exclusion rule allows use of up to 62.5 acres of prime farmland for the Project. The total acreage of prime farmland within the Anticipated Development Area exceeds 62.5 acres. The prime farmland out of agricultural production for the operating life of the Project but not permanently.

The prime farmland exclusion rule does not limit the amount of farmland used for a generator if a feasible or prudent alternative is not available. Birch Coulee Solar completed an evaluation to avoid prime farmland (Appendix E). Birch Coulee Solar was unable to find a feasible or prudent alternative to the Project and therefore satisfies the rule requirement to show that no feasible and prudent alternative exists (Section 4.5.4 and Appendix E). Furthermore, Birch Coulee Solar prepared an AIMP in consultation with the MDA (Appendix D) and a Vegetation Management Plan (VMP) (Appendix F) to minimize Project impacts such as soil compaction, topsoil mixing, soil erosion, invasive and noxious weed species, and rutting.

3.2.2 Alternatives Considered But Rejected

As previously stated, the Project qualifies for the alternative review process. Therefore, Birch Coulee Solar is not required to include information regarding alternative sites pursuant to Minn. R. 7850.3100 unless it rejected alternative sites. Birch Coulee Solar did analyze other areas in Minnesota to seek a location that meets the limits in the Prime Farmland Rule. However, these areas were determined to not be feasible or prudent for siting the Project and were not carried forward as Project alternatives (Appendix E).

3.3 Project and Associated Facilities

The Project will have a nameplate capacity of up to 125 MWac. Project components, which are described further in Section 3.4, consist of:

- Single axis tracking PV arrays installed on driven piles or helical screws
- Inverters, which house AC-DC inverters and medium-voltage step-up transformers
- Buried electrical collection line cables
- Project substation, which will house a backup generator
- Step-up transformers
- Metering equipment
- Supervisory Control and Data Acquisition (SCADA) systems
- Short (<500 feet) 115 kV gen-tie line between the Project substation and the utility-owned switchyard, which will connect to the Xcel Energy Franklin Substation
- Gravel access roads
- Security fencing and gates
- Stormwater management system
- Temporary laydown areas, some of which will be permanently used for operational purposes within the Anticipated Development Area
- Operations and maintenance (O&M) building, which will house a generator
- One temporary weather station and up to three permanent weather stations

Table 3-3 provides the total anticipated acreages of the Project components and Map 3 illustrates their anticipated locations of these components. The Project layout maximizes the operational footprint of the solar facility, with the understanding that components may shift within the Anticipated Development Area if needed based on engineering design, equipment availability, environmental constraints, stakeholder feedback, and constructability. The proposed equipment is preliminary and subject to change as the design advances.

Table 3-3 Acreage of Project Components

Component	Measurement or Count
Solar arrays	290,948 panels; 484.0 acres
Inverters	36 inverter/transformer units; approximately 1.1 acres
Buried electrical collection lines	46,290 feet; approximately 8.5 acres
Project substation	1.2 acres
115 kV gen-tie line	<500 feet; approximately 0.8 acres
Laydown yard (temporary and some permanent)	24.3 acres
Gravel access roads	30,580 feet; up to approximately 14.0 acres
Stormwater management system	21.3 acres
Weather stations	Three permanent stations; total of up to approximately 0.3 acres
Undeveloped areas (e.g., delineated wetland and drain tile avoidance, setback areas) and non-Project component (utility-owned switchyard)	486.1 acres
Total Site	1,041.6 acres

3.4 Engineering and Operational Design

3.4.1 Design

Solar energy generation begins with the PV modules (solar panels) converting energy from sunlight into direct current (DC) electrical power. Sets of panels will connect in series and terminate at an inverter. The inverters will convert the DC power from the panels to AC power. The power will then be stepped-up at a transformer from 34.5 kV to 115 kV at the Project substation, transmitting generated power to a proposed switchyard that the utility will design, construct, and connect to existing transmission infrastructure at the adjacent Franklin 115 kV Substation. Figure 1 depicts a general layout of typical solar project components.

Figure 1 Solar Energy Generation Diagram

3.4.2 Photovoltaic (PV) Arrays and Solar Field

Understanding that final panel selection may change prior to construction, current design assumes a Jinko 580W module. The PV panels are anticipated to have:

- tempered coated dual glass
- a tilt angle range of ±50 degrees
- approximately 24 inches of ground clearance
- a maximum tilt height of approximately 8 to 10 feet above the ground surface, pending final design

The PV panels will be on a single-axis tracker racking system in linear arrays oriented north-south. The Project is expected to include approximately 530 rows with approximately 14 feet between trackers. Motors located on the racking system rotate the panels on a single point to track the sun. The racking system design consists of horizontal steel support beams, known as torque tubes, with a drive train system that divides the array into two sides and is usually in the center of the rows. The racking system is supported by vertical steel piles that are typically driven into the ground with an embedment depth of 6 to 9 feet. A typical tracker profile is illustrated in Figure 2. Birch Coulee Solar will design the tracker system and associated posts to withstand wind, snow, and seismic loads anticipated at the Site.

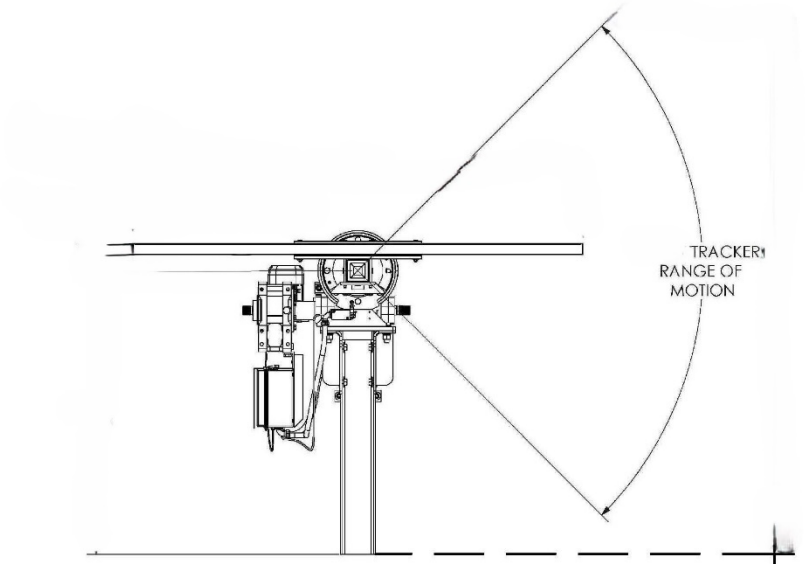


Figure 2 Typical Tracker Profile

3.4.3 Electrical Collection System and Power Conversion

Birch Coulee Solar will install the electrical collection system and associated communication lines in trenches (at least three feet deep) using direct burial methods. Multiple installation methods (e.g., trenching, plow method) may be used and will be determined based on site-specific conditions, consistent with general solar project construction practices. Following installation, suitable native soil most likely from the immediate vicinity of the excavation or from within the Site as needed will be placed around the cable

and compacted. According to the preliminary collector line system layout, the entire system will be underground.

Power from the panels will be transmitted to 36 inverters that will be mounted on a steel skid and set on a steel pile or concrete pad foundation. If the pad is concrete, it may be mixed on site, or a project-specific concrete pad may be delivered to the Site; the concrete installation method will be determined closer to construction. Each inverter station houses an AC-DC inverter, medium-voltage transformer where the electrical current is stepped up to a voltage of 34.5 kV, and a cabinet that houses power control electronics. Figure 3 illustrates a representative inverter, which has approximate dimensions of 20 feet long by 8 feet wide by 9 feet tall. The electricity is then carried via an underground medium-voltage collection system to the Project substation, then to the proposed utility-owned switchyard via a gen-tie line, and then to the POI at the existing 115 kV Franklin Substation (Map 3).

Figure 3 Inverter Example

3.4.4 Project Substation

The Project substation will be in the southwest corner of the Site (Map 3) and surrounded by a 7-foot-tall chain link security fence with a 1-foot-tall, barbed wire strand (Section 3.4.8). The collector system voltage transmitted from the inverters will be stepped up from 34.5 kV to 115 kV at the Project substation and transmitted to the existing Franklin 115 kV Substation via a gen-tie line and proposed utility-owned switchyard. The final interconnection layout and need for a gen-tie line and utility-owned switchyard will be determined in conjunction with the transmission owner (Xcel Energy). Birch Coulee Solar will design the Project substation in accordance with regional utility practices and codes such as:

- American Concrete Institute 318 and 336
- American Institute of Steel Construction 360
- American Society of Civil Engineers 7
- American National Standard ANSI C12 and C57
- Federal Energy Regulatory Commission 827
- International Building Code
- Insulated Cable Engineers Association P-32-382 and P-45-482
- International Electrotechnical Commission 61000-4-30
- Institute of Electrical and Electronics Engineers 80, 693, 837, 998, 1036-2010, 1453-2015, 1584-2018, 2800, C37, C62
- National Electrical Code (NEC)
- National Electrical Safety Code (NESC)
- Underwriters Laboratories 83 and 467

The Project substation will consist of supporting structures for high voltage electrical structures, breakers, transformers, lightning protection, and control equipment according to the specifications of the Interconnection Agreement with MISO and the transmission owner.

3.4.5 Substation Control House and Supervisory Control and Data Acquisition (SCADA) System

PV inverters will communicate with control equipment via a redundant fiber ring within a substation control house at the Project substation, allowing for monitoring and remote access by the O&M team. A PV Power Plant Controller will coordinate the interactions of the PV field to not exceed the POI limit of 125 MW. The Site SCADA historian will aggregate and relay information to the utility remote terminal unit to meet the requirements of the GIA and PPA.

3.4.6 Generation Tie

The Project currently includes a 115 kV overhead gen-tie line constructed with steel monopole structure(s) that are not anticipated to exceed 100 feet in height. This overhead high-voltage line will connect the Project substation to a utility-owned switchyard, and then interconnect to the grid using the utility-owned ring-bus POI at the existing Franklin 115 kV Substation. The final layout of the interconnection facilities, including the need for a gen-tie line and utility-owned switchyard, will be determined in conjunction with the transmission owner. Birch Coulee Solar will construct the gen-tie line in accordance with the NESC and other applicable codes and per industry standards listed in Section 3.4.4.

3.4.7 Access Roads

The Project anticipates installing six separate gravel access roads within the Anticipated Development Area. Access road widths are typically 20-feet wide at Site entrance gates and 16 feet wide in other areas of the Site during Project operations. During construction, access road installation and use could result in temporary soil disturbance of a maximum width of 50 feet. Once construction is complete, Birch Coulee Solar will restore temporarily disturbed areas in accordance with the MDA's guidance. Birch Coulee Solar will remove excess road material and rocks greater than 12 inches and use topsoil to return the surface to the approximate pre-construction contours unless the landowner requests that the access road remain.

Birch Coulee Solar will access the northern portion of the Project from 670th Avenue and County Highway 73, the southeastern portion from 660th Avenue and County Highway 73, and the southwestern portion from State Highway 19. The proposed entrances will have locked gates.

Some upgrades or other changes to the public roads may be necessary for construction or operation of the Project. Birch Coulee Solar will work with Renville County, townships, and/or city of Franklin to facilitate upgrades to meet required standards and with landowners for final design considerations. Upgrades or changes could include, but are not limited to, road improvements, additional aggregate, and driveway changes.

3.4.8 Fencing

Birch Coulee Solar will install permanent 7-foot-tall security fencing in compliance with NEC requirements along the perimeter of the Anticipated Development Area (including the PV panels, buried electrical collector cable system, inverters, and Project substation) to prevent public and larger wildlife access. This proposed height is below the DNR's recommended height to be consistent with perimeter fencing around existing community solar gardens in the Project vicinity. To this end, perimeter fencing for the Project will consist of 7-foot-tall woven wire fencing with a 1-foot high-tensile smooth wire, installed with wooden posts. Posts along the fence line are anticipated be directly embedded in the soil, and corner and gate posts are anticipated to be set in concrete foundations, which will be poured on-site. The perimeter fencing will not impact the public's access to County Road 73. The fencing around the Project substation will be a 7-foot-tall chain link security fence with a 1-foot-tall, barbed wire strand to comply with the NEC.

3.4.9 Stormwater Management

Birch Coulee Solar will design the Project to consider and incorporate offsite drainage patterns and maintain or reduce the discharge flow rate and erosion from existing conditions. This will be achieved through the establishment of perennial vegetation in accordance with the VMP and the usage of permanent stormwater detention or retention basins, as needed, to release stormwater runoff at the existing or a reduced rate. The Project design will consider and incorporate the existing and proposed watershed conditions of the Site to minimize changes to existing on-site and off-site drainage flow paths during operations. Map 3 illustrates the anticipated locations of the permanent stormwater detention or retention basins (preliminary and subject to change as the design advances).

Birch Coulee Solar will prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with MPCA standards and guidance specific to solar projects (reference (2)). The SWPPP will include erosion and sediment control best management practices (BMPs) such as construction track out controls, silt fence, sediment basins, permanent seeding, and vegetated buffers. This will minimize the potential for downstream water quality impacts throughout the duration of construction and operation of the Project.

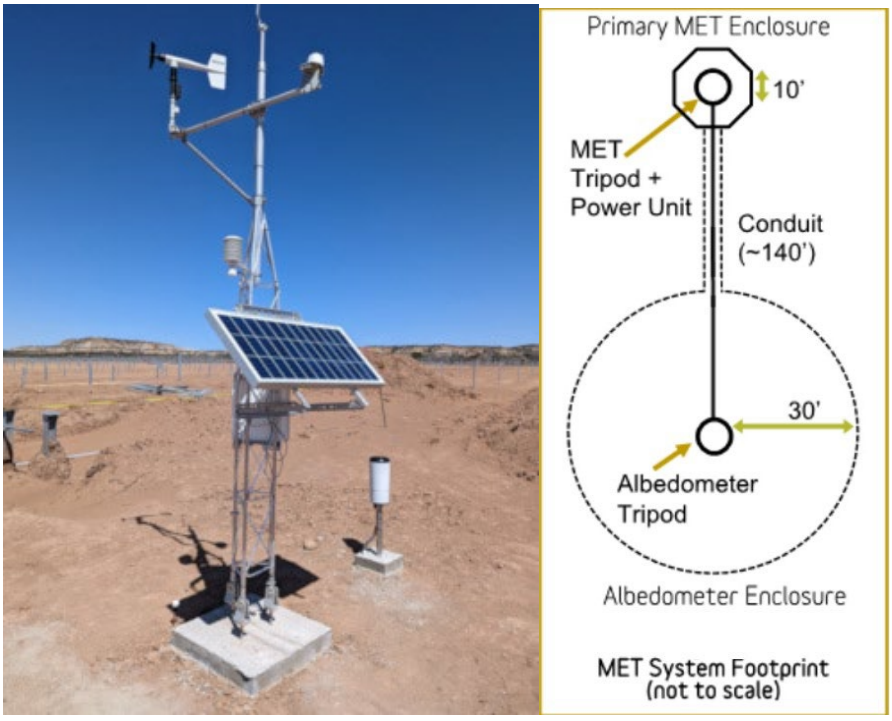
3.4.10 Laydown Areas and O&M Building

Birch Coulee Solar will use temporary graveled laydown areas during construction for storage of construction materials and supplies, equipment, temporary parking for Project-related vehicles, and deliveries. Two laydown areas will be outside of the Anticipated Development Area (approximately 14.5 acres) and will be fenced and used during Project construction. After construction is complete, these areas will be restored according to the VMP and SWPPP. The remaining laydown areas (approximately 9.8 acres) are within the Anticipated Development Area; some of these laydown areas will continue to be used during Project operation and the others will be restored according to the VMP and SWPPP (Map 3). The gravel laydown areas within the Anticipated Development Area that are for use during operation of the Project will serve as space for vehicle parking and storage of spare parts and other equipment.

The O&M facility may be within a permanent laydown yard in the Anticipated Development Area or in an existing building in proximity to the Project. As such, the O&M building is listed as a Project component, but the acreage is not included in Table 3-3. The specific location of the O&M facility will be determined prior to construction.

3.4.11 Weather Stations

Birch Coulee Solar will install one temporary weather station 18 months prior to construction at a location agreed upon by a participating landowner near the center of the Project. The weather station will extend to a height of approximately 10 feet above ground level. During operation of the Project, Birch Coulee Solar anticipates installing three permanent weather stations throughout the Site to measure critical weather data such as wind speed and direction, ambient temperature, solar irradiance, etc. Figure 4 illustrates a typical weather station for a solar facility.



Source: reference (3)

Figure 4 Typical Weather Station

3.4.11 Pipeline System

The Project does not require construction of or access to a pipeline system. Therefore, this section is not applicable to the Application.

3.5 Construction, Commissioning, and Restoration Activities

3.5.1 Construction

Pre-construction and construction activities for the Project consist of:

- Pre-mobilization activities (approximately 7 months)
    - Complete final design of the Project and obtain all construction-related permits
    - Procure equipment/Project components
    - Locate and mark existing utilities
    - Delineate the limits of construction disturbance areas by surveying, flagging, and staking
- Mobilization activities (approximately 1 month)
    - Install stabilized construction entrances and sediment control BMPs
    - Install any necessary temporary security fencing
    - Grade and gravel the temporary laydown areas for office trailers, storage of construction materials and shipped equipment containers, receiving construction deliveries, and temporary parking for Project-related vehicles
    - Mobilize office trailers and construction equipment
    - Receive material deliveries
    - Survey and mark the locations of access roads, solar arrays, collection system, gen-tie line alignment
- Construction activities (approximately 8 months)
    - Install erosion and sediment control BMPs per applicable permit requirements
    - Remove vegetation within the solar arrays and substation
    - Strip and stockpile topsoil within the solar arrays and substation
    - Construct access roads
    - Site grading
    - Install fencing, inverters, and transformer pads
    - Pile driving and installation

- Install tracker and solar modules
- Install inverters
- Install collection system and communication lines
- Install gen-tie line
- Substation construction will occur simultaneously with the solar arrays

Typical onsite construction staff levels will depend on the number of concurrent tasks occurring and the phasing of the Project. Birch Coulee Solar anticipates the Project to generate up to 300 temporary construction jobs throughout the construction of the Project. Generally, the number of construction workers on-site will be lower in the early stages of pre-construction activities, approximately several dozen, and will peak during the concurrent and phased installation of Project components. As construction of the Project components ends and commissioning and restoration activities begin, the number of workers on-site will decrease to levels like the pre-construction stage.

Birch Coulee Solar does not anticipate the need to clear trees for the Project during the pre-construction phase; however, if tree clearing is necessary, it will occur outside of the June 1 to August 15 period as described further in Section 4.5.8 of this Application.

Birch Coulee Solar estimates that there will be between 10 and 20 semi-trucks used daily for equipment delivery during the peak of construction. This volume of traffic will occur for several months during delivery of piles, trackers, and modules. Truck traffic will be lower leading up to the peak of construction during delivery of other Project components and will decrease again after these components are delivered. Light duty trucks and/or passenger vehicles will also be used to transport construction workers to and from the site daily; the workers may be responsible for their own transportation and/or the engineering, procurement, and construction (EPC) contractor may transport groups of workers to the site. Birch Coulee Solar anticipates using the following typical and specialty construction equipment during construction:

- Scrapers
- Bulldozers
- Dump trucks
- Watering trucks
- Motor graders
- Vibratory compactors
- Backhoes
- Side-by-sides
- Gas or diesel remote generators for power
- Telehandler for equipment offload and load, diesel

- Skid steer loader
- Pile driver
- Medium duty crane
- All-terrain forklift
- Concrete truck and boom truck
- High reach bucket truck
- Truck-mounted auger or drill rig

Birch Coulee Solar will work with Renville County and the city of Franklin to develop a traffic control plan prior to construction to minimize the impact of vehicular traffic on the local area. The traffic plan will consider details including the following: any dedicated haul routes, school zones, hours of operations, the types of vehicles needed in specific locations, and signage. Upon completion of construction, heavy equipment will be removed from the Project site.

3.5.2 Inspections and Commissioning

Birch Coulee Solar will construct and operate the Project consistent with applicable state and federal safety regulations and will inspect the solar array and ancillary electrical equipment during commissioning, occurring over a period of approximately three to four months. In addition, the interconnecting utility will inspect equipment (for grid and system safety) prior to being brought online. Once the array is installed, qualified personnel will routinely inspect, operate, and repair them as necessary pursuant to preventive maintenance schedules.

3.5.3 Restoration

As portions of the Project near completion, demobilization of equipment and restoration of the temporary laydown yards and other temporary disturbance areas will occur. This includes final grading, decompacting soils, and seeding according to the Project's VMP (Appendix F) and the SWPPP. Birch Coulee Solar anticipates that the post-construction site restoration activities will take approximately four to six months.

The VMP includes additional information regarding site preparation, seed mixes, management of invasive species and noxious weeds, and ongoing management and monitoring after construction.

3.6 Operation and Maintenance (O&M)

Birch Coulee Solar will operate and maintain the Project locally with three local field solar technicians dedicated to the Project. Communication of data streams from the PV Control and SCADA equipment will occur to the remote Regional Operations and Control Center 24 hours a day and seven days a week. The Project will have a remote regional O&M Engineering team and a Technical Services Team to support the local field technicians as needed.

Equipment performance and material condition support reliable operation of the solar site. Reliable operation is achieved using a strategy that includes methods to anticipate, prevent, identify, and promptly resolve equipment performance problems and degradation.

The Computerized Maintenance Management System is the central tool to capture all maintenance required and performed on solar site equipment. This system generates preventative, predictive, and corrective tasks based upon the latest Original Equipment Manufacturer recommendations and Birch Coulee Solar's experience. The CCMS work order prioritization and scheduling considers safety, environmental conditions, criticality, and capacity. Through this preventative maintenance program, Birch Coulee Solar strives to avoid unplanned, forced, or maintenance outages. Should a piece of equipment fail and result in an unscheduled outage, Birch Coulee Solar will consider implementation of new or modified preventative measures to avoid similar failures in the future.

3.7 Repowering and Future Expansion

Birch Coulee Solar's interconnection request is for 125 MW, and there are currently no plans for future expansion of the Project.

As the solar market continues to produce less expensive and more efficient solar panels, repowering may be a viable option as the Project ages. Potential triggers for initiating a repower may be aging or faulty equipment, maintenance costs, extending the useful life of the solar panels, or increasing the generation output. If deemed a worthwhile investment, repowering of the Project will abide by all applicable local, state, and federal regulations. A new or amended Site Permit may be necessary and will be sought if required.

3.8 Decommissioning

At the end of the useful life of the Project, Birch Coulee Solar will be responsible for decommissioning the Project and restoring the Site to its prior use. Appendix G provides a draft decommissioning plan; PUC permits require updates of the decommissioning plan at five-year intervals and at project milestones such as repowering or changes in ownership. Decommissioning of the Project at the end of its useful life will consist of removing the:

- Solar arrays (panels, racking and steel foundation posts)
- Inverters
- Fencing
- Access roads
- Above-ground and below-ground portions of the electrical collection system
- Lighting
- Substation
- Gen-tie line

Birch Coulee Solar will use standard decommissioning practices including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements, and restoration. Birch Coulee Solar will provide financial assurance in one of the following forms:

- Self-bond

- Surety bond
- Federally insured certificate of deposit
- Government-backed securities
- Corporate guarantee
- Letter of credit
- Cash

Table 3-4 Estimated Net Decommissioning Costs

Activity	Total
Total Estimated Decommissioning Cost	$13,447,226
Total Estimated Salvage Value	$10,103,747
Net Estimated Decommissioning Cost	$3,334,478
Net Estimated Decommissioning Cost (Low Range -30%)	$2,340,435
Net Estimated Decommissioning Cost (High Range +50%)	$5,015,217

3.9 Cost Analysis

Birch Coulee Solar estimates the Project capital construction costs, including development, EPC, and interconnection to be approximately $245 million (Table 3-5). Actual total costs may vary up to 20 percent as they are dependent upon factors such as timing of construction, final panel selection, labor costs, taxes, and tariffs.

Table 3-5 Project Cost Estimate

Project Component	Estimated Cost
Development, Financing, Engineering, Procurement, and Construction (EPC) (Panels, Panel Racking, Cabling, Inverters, Fencing, Transformers, Construction Contractor/Labor)	$229,500,000
Interconnection	$15,000,000
Project Gen-Tie Line	$500,000
Total	$245,000,000

The principal operating and maintenance costs include inspections, which are typically ground-based and generally occur on a yearly basis. The estimated annual operation cost is $1,000,000 and consists of lease payments, operational staff wages, taxes, and inspection/maintenance.

4 Environmental Information

The following sections provide a description of the existing environmental and human setting of the Project, analysis of the potential impacts of the Project and associated mitigative measures, and any unavoidable adverse environmental effects. In this Application, the term “mitigative measures” means proposed actions that will avoid or minimize impacts, including best management practices (BMPs), and any proposed actions to compensate for unavoidable impacts (compensatory mitigation). Baseline conditions are described per the Site and/or Anticipated Development Area (Table 3-2, Map 3).

4.1 Environmental Setting

The Project is in a rural agricultural area, immediately north of and partially within the city of Franklin, Minnesota. Residences, primarily farmsteads, are scattered throughout the Site and its vicinity.

The DNR, in collaboration with the U.S. Forest Service, developed an Ecological Classification System (ECS) for hierarchical mapping and classification of Minnesota land areas with similar native plant communities and other ecological features. Based on the ECS, the Site is in the middle of the Minnesota River Prairie Subsection of the North Central Glaciated Plains Section of the Prairie Parkland Province (reference (4)).

The boundaries of the Minnesota River Prairie Subsection intersect large till plains that flank the Minnesota River. The Minnesota River’s broad valley cuts the subsection in half. Loamy ground moraine is the dominant landform, with end moraines and lake plains also occupying some of the subsection. Annual precipitation ranges from 25 inches in the west to 30 inches in the east. The growing season generally lasts 147 to 152 days. Pre-settlement vegetation in the Minnesota River Prairie Subsection primarily consisted of tallgrass prairie with several islands of wet prairie. Deciduous forests grew along floodplains associated with watercourses (reference (4)). At present, the predominant landcover in the subsection is agriculture.

4.2 Human Settlement

Approximately 86 acres of the Site (8 percent) are within the city of Franklin municipal boundary which is immediately south of the Project. These 86 acres are currently used for agricultural purposes and represent approximately 12 percent of the city of Franklin’s total 1.08 square mile area. The population of the city of Franklin was reported as 493 in the 2020 U.S. Census (reference (5)). Other nearby communities include:

- The city of Morton, located 3.9 miles to the west, and with a population of 410 people (reference (6))
- The city of Fairfax, located 5.2 miles to the east, and with a population of 1,250 people (reference (7))
- The Lower Sioux Indian Community, located 3.6 miles west, and with a population of 576 people (reference (8))

Outside of the more concentrated residential areas listed above, the surrounding area is made up of mostly rural and farmstead residences.

4.2.1 Public Health and Safety

Emergency services could be necessary during construction or operation activities due to falls, equipment use, or electrocution. If emergency personnel are necessary, multiple services would likely respond, depending on the situation. Emergency response services closest to the Project include Renville County Sheriff (reference (9)) and Franklin Fire & Rescue (reference (10)). Other nearby responders include those in Fairfax and Morton.

CentraCare offers medical services at hospitals and clinics throughout Central Minnesota. The closest urgent care facility to the Project is the CentraCare Redwood Hospital in Redwood, approximately 12.5 miles west.

The Allied Radio Matrix for Emergency Response (ARMER) system consists of four towers in Danube, Olivia, Hector, and Morton, Renville County (reference (11)). The closest tower is in Morton, approximately 3.9 miles from the Site. These ARMER towers are a part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders (reference (12)). The ARMER radio system operates by line of sight, talking to other towers. For the system to operate effectively, multiple towers are necessary to produce a solid blanket of coverage. System interruption can occur if tall objects are within the line-of-sight, typically at or near the top of a tower over 150-feet tall.

4.2.1.1 Impacts and Mitigative Measures

Construction and operation of the Project will have minimal impacts on the security and safety of the local population. The Project design and construction will meet applicable federal, state, and local standards (e.g., MISO and the NESC). The Project will also include fencing and locked gates for authorized access only.

Birch Coulee Solar will coordinate with emergency and non-emergency response teams for the Project, including law enforcement, fire departments, and ambulance services. The type and number of responding agencies will depend on the incident requiring emergency services. Birch Coulee Solar will develop an Operations and Emergency Action Site Safety Plan prior to construction that outlines local contacts (first responders and internal construction, and O&M staff) and emergency procedures for evacuation, fire response, extreme weather, injury, and criminal behavior. This plan will identify all available Site access points. Additionally, construction will comply with applicable local, state, and federal safety regulations. Birch Coulee Solar will follow industry safety procedures during and after construction of the Project such as posting clear signage during construction activities.

The closest ARMER tower is approximately 3.9 miles west of the Site. The Project will not impact the ARMER towers given their distance and because no Project facilities will be within the line-of-sight near the top of these towers (i.e., greater than 150 feet above ground). Therefore, mitigative measures concerning the ARMER system are not proposed.

4.2.2 Electromagnetic Fields

Electric and magnetic fields (EMF) are present around electrical devices and are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. 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. Electric fields come from voltage or electrical charges, while

magnetic fields come from the flow of electricity or current that travels between points. Magnetic fields, unlike electric fields, are not shielded or weakened by materials that conduct electricity (e.g., trees, buildings, and human skin). Rather, they pass through most materials. Both magnetic and electric fields decrease rapidly with increased distance from the source. Research to determine if EMF causes health effects and biological responses has been occurring since the 1970s. Over the decades of research, human health effects of the possible impact of exposure to EMF has been reviewed by leading health agencies, like the U.S. National Cancer Institute, the U.S. National Institute of Environmental Health Services (NIEHS), and the World Health Organization (WHO). The research and reviews found that exposure to EMF does not cause or contribute to adverse health effects (reference (13)).

Table 4-1 provides examples of electric and magnetic fields associated with common household items. Electrical components of the Project such as solar arrays, electrical collection lines, inverters, and the gen-tie line will generate EMF. EMF generated from solar arrays is extremely low frequency, like levels generated by electrical appliances and wiring in homes and buildings (reference (14)). The following table provides examples of electric and magnetic fields associated with common household items.

Table 4-1 Electric and Magnetic Field Strength of Common Household Objects

Electric Field		Magnetic Field			
Appliance	**kV/m**	**Appliance**	**mG**		
	1 foot		**1 inch**	**1 foot**	**3 feet**
Stereo receiver	.18	Circular saw	2,100 to 10,000	9 to 210	.2 to 10
Iron	.12	Drill	4,000 to 8,000	22 to 31	0.8 to 2
Refrigerator	.12	Microwave	750 to 2,000	40 to 80	3 to 8
Mixer	.10	Blender	200 to 1,200	5.2 to 17	0.3 to 1.1
Toaster	.08	Toaster	70 to 150	0.6 to 7	<.1 to 0.11
Hair dryer	.08	Hair dryer	60 to 200	<0.1 to 1.5	<0.1
Television	0.6	Television	25 to 500	0.4 to 20	<0.1 to 1.5
Coffee maker	.06	Coffee maker	15 to 250	0.9 to 1.2	<0.1

Source: reference (15)

As noted above, electric field strength generated by solar arrays is like that of household appliances. Measured magnetic fields at similar photovoltaic (PV) projects found very low levels of 0.5 milligauss (mG) or less, and in many cases less than background levels (0.2 mG). This was at distances of no more than 150 feet from the utility-scale inverters (reference (16)). Multiple studies concluded that the strength of EMF present at the perimeter of a solar facility is significantly lower than the typical American's average EMF exposure (references (17); (18)).

The Project includes a 115 kV overhead gen-tie line (<500 feet) between the Project substation and a utility-owned switchyard. The NIEHS reported that under 115 kV overhead transmission lines, the typical electric field levels are 1.0 kilovolts per meter (kV/m) before dissipating to 0.5 kV/m at 50 feet (the approximate edge of the transmission right-of-way). Typical magnetic field levels directly below a 115 kV overhead transmission line were 29.7 mG, before dissipating to 6.5 mG at 50 feet (reference (14)). For buried electrical collection lines, a study found at 27.5 kV (slightly lower voltage than the Project lines) that magnetic fields are within background levels at 1 meter above the ground surface (reference (19)).

Minnesota currently does not regulate magnetic field exposure. There is also no federal standard for transmission line electric field exposure. The PUC has imposed a maximum electric field limit of 8 kV/m measured at 1 meter above the ground to prevent hazards from shocks underneath AC transmission lines of 500 kV or greater (reference (20)). The PUC has repeatedly concluded that there were no adverse

health impacts from EMF anticipated for persons living or working near a high voltage transmission line, including a larger, 345 kV line in the Huntley-Wilmarth Transmission Line Project (reference (21)). Similarly, there were no adverse impacts from EMF found for those with residences near the Byron Project, a utility-scale solar project (reference (22)).

No interference with any medical devices is expected because of the low levels of EMF outside the fence. The levels where interference with pacemakers and other implanted devices has been found is 1,000 times greater than the Project levels (reference (16)).

4.2.2.1 Impacts and Mitigative Measures

The primary EMF sources from the Project will be from the solar arrays, buried electrical collection lines, gen-tie line, and the transformers installed at each inverter. Based on various studies, the EMF health and safety impacts from solar energy facilities are negligible.

Map 5 illustrates residences in the immediate proximity of the Project. The nearest residences to the Anticipated Development Area include:

- Residence 1 is approximately 240 feet from the nearest solar panel. The nearest inverter will be a greater distance from the residence than the nearest solar panel
- Residence 2 is over 300 feet from the nearest solar panel. The nearest inverter will be a greater distance from the residence than the nearest solar panel
- Residence 3 is over 300 feet from the nearest solar panel. The nearest inverter will be a greater distance from the residence than the nearest solar panel

The 115 kV gen-tie line will be near the Project substation. Residence 5 is more than 1,600 feet from the Project substation and is the closest residence.

Based on these scientific studies and the level of EMF that will be associated with the Project, no health impacts from EMF are anticipated. As such, no mitigative measures are proposed.

4.2.3 Displacement

Displacement can occur when residences or businesses are within a proposed site or right-of-way. Displacements are rare and more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible. There are no existing structures within the Site that require removal.

4.2.3.1 Impacts and Mitigative Measures

There are no residences within the Site (Map 5); therefore, no displacement will occur. The driveway associated with the residence labeled as 1 on Map 5 extends south from the residence and outside of the parcel associated to the residence. Birch Coulee Solar discussed the driveway location with the landowner and will continue to work with the landowner to provide suitable access to the home.

4.2.4 Noise

Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more “weight.” The A-weighted decibel

scales (dBA) is used to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that we do not hear as well, such as very high and very low frequencies.

Audible traffic sounds are likely present in the Site. Minnesota State Highway 19 travels across the southern edge of the Site as well as several other county and township roads (Section 4.2.14). The existing Franklin 115 kV Substation is also adjacent to the Site, and faint sounds from these operations are part of the existing sound character. Other sound sources in the vicinity include agricultural activities on neighboring properties, vegetation, birds, and insects. Typical rural sound levels are in the 30-55 dBA range, with variability depending on local activities, time-of-day, weather, and season.

The MPCA noise standards are set forth in Minn. R. Ch. 7030, which sets noise limits for different land uses (Table 4-2). Different standards are specified for daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) hours. The noise standards specify the maximum allowable noise volumes that may not be exceeded for more than 10 percent of any hour (L10) and 50 percent of any hour (L50). Residences are classified as Noise Area Classification (NAC) 1 per Minn. R. 7030.0050, subp. 2. NAC 1 has the lowest noise limits of the three NACs. The limits for NAC 1 are listed in Table 4-2.

Table 4-2 Minnesota Noise Standards NAC 1 Noise Limits

Noise Classification	Daytime limit (dBA)		Nighttime Limit (dBA)	
	L10	L50	L10	L50
NAC – 1	65	60	55	50

Minn. R. 7030.0040

Figure 5 outlines a comparison of typical noise-generating sources.

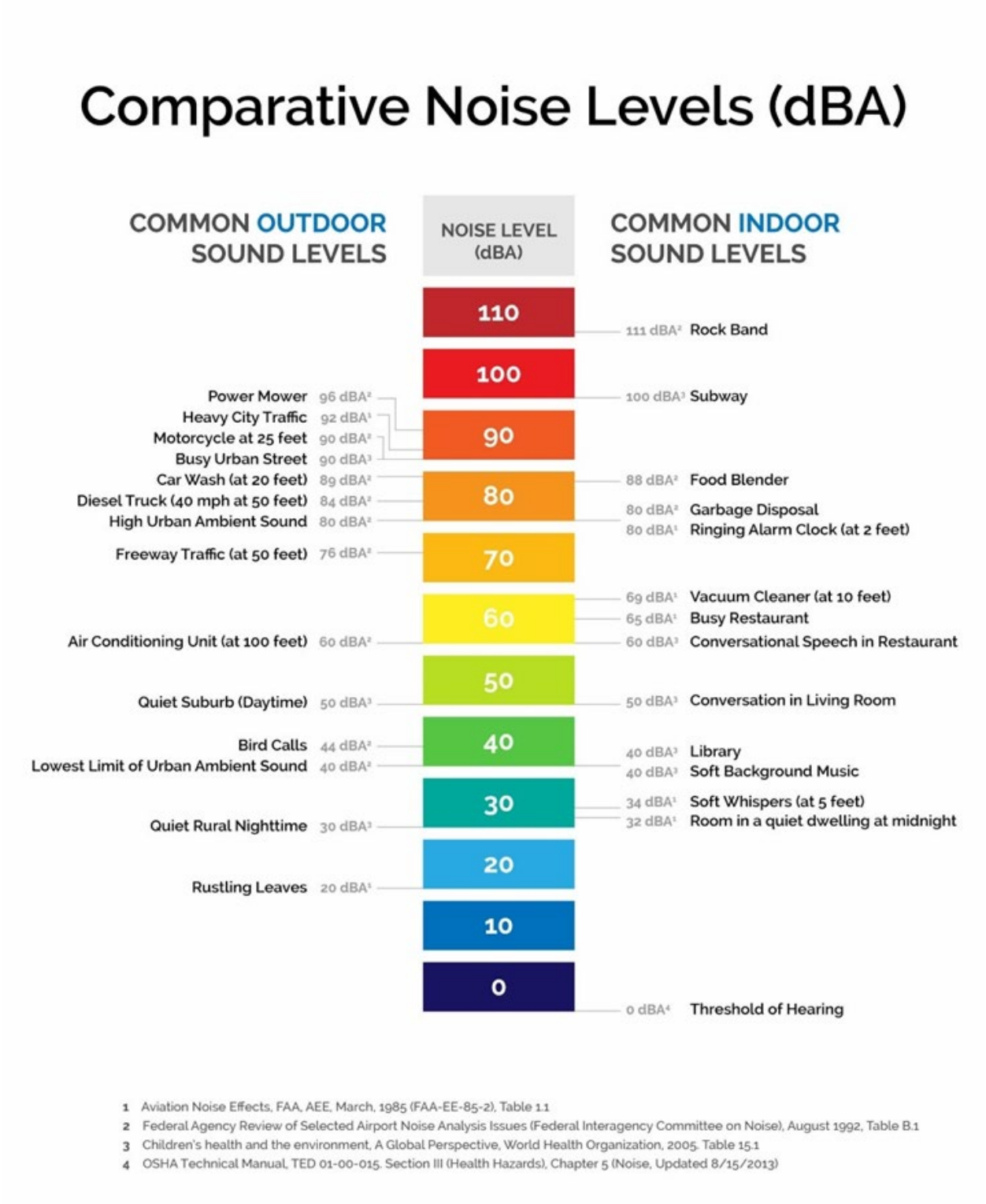


Figure 5 Common Noise Sources

4.2.4.1 Impacts and Mitigative Measures

Construction Noise

Table 4-3 shows the maximum sound pressure levels in dBA at 50 feet for construction equipment such as bulldozers, bobcats, and scrapers (reference (23)).

Table 4-3 Typical Sound Levels from Construction Equipment

Equipment	Max Sound Pressure Level at 50 feet (dBA)
Excavator	85
Dozer	85
Grader	85
Roller	85
Dump Truck	84
Concrete Mixing Truck	85
Concrete Pumper Truck	82
Man-lift	85
Flatbed Truck	84
Large Crane	85
Small Crane	83
Compactor (Vibratory)	80

Construction vehicles and equipment will create intermittent noise, and thus be limited by the NAC-1 L10 metric. The noise from construction activities will dissipate with distance and be audible at varying decibels (dB), depending on the locations of the equipment and receptor. Noise associated with construction will likely be perceptible at nearby residences. These noise impacts will be temporary, and the amount of noise will vary based on what type of construction is occurring on a given day. Sound levels from grading equipment are not dissimilar from the typical tractors and larger trucks used in agricultural communities during planting or harvest. The most significant source of construction noise is the pile driving equipment associated with installation of the foundations for the solar arrays if the EPC contractor elects to use driven piles (or the helical pile machine or earthmoving equipment if the EPC contractor elects to use helical piles). Federal Highway Administration Construction guidance shows power hammer noise levels of approximately 90 dBA at 50 feet. When dissipation at distance is considered, the construction noise will be at NAC-1 L10 compliant levels at approximately 800 feet.

During construction, intermittent noise will be emitted by the construction vehicles and equipment, including pile drivers for installation of piers. These noise impacts will be temporary, and the amount of noise will vary based on what type of construction is occurring at the Project on a given day.

Birch Coulee Solar may limit the duration of foundations installation within that distance of a particular residence in any given hour or may elect to erect temporary mobile noise barriers adjacent to the installation operation to reduce impacts. If the EPC contractor elects to install a helical pile based on ad-freeze (frost heave) conditions at the site, the installation will take longer but will be quieter. As stated above, these noise impacts will be temporary, and Birch Coulee Solar will limit construction to daytime operations as much as possible to minimize potential disturbances associated with construction equipment.

Operational Noise

The main sources of noise from the Project during operations will be from the transformers and inverters, although some minor noise may be generated from the short gen-tie line in the form of corona (crackling) or from wind blowing through the conductors and structures. Panel tracking drives may produce limited duration noises as panel angles adjust throughout the day and reset to initial positions once a day. Panel tracking noises are expected to be of limited duration such that they do not affect compliance with state standards. The type of noise from operation of the Project is not new for the general area (given the existing Franklin 115 kV Substation) but will extend into areas that have not routinely experienced it in the past. The nearest residential receptor is Residence 1 (Table 4-4), situated approximately 240 feet from the nearest solar array. The relatively steady sound of the facility in operation will be limited by the NAC-1 L50 metric. The noise level modeled at this residence is approximately 36 dBA, well below the NAC-1 L50 nighttime limit of 50 dBA. Modeled impacts from the Project are below the state noise standards. Because the Project is expected to comply with the applicable noise limits, Birch Coulee Solar does not propose mitigative measures.

4.2.5 Communication, Radio, and Television Interference

According to publicly available Federal Communications Commission (FCC) sources, there are no Amplitude Modulation (AM), Frequency Modulation (FM), microwave, TV, or other broadcast transmission towers within the Site. There are 9 AM and 23 FM radio broadcasting stations that operate within the vicinity of the Project (reference (24)).

There are three local digital television channels in the Project vicinity (ABC, CBS, and PBS). The nearest tower with the strongest signal is in Redwood Falls, Minnesota (reference (25)).

There are no cellular towers in the Site. There are two towers in Morton, Minnesota. One is on Monument Drive, around 4.4 miles west of the Project, and the other is on U.S. Highway 71, around 6 miles west of the Project. The third closest tower is just south of Fairfax, around 7 miles from the Project (reference (26)). Several cellular phone service providers operate in the vicinity of the Project, including large carriers like AT&T, T-Mobile, and Verizon (reference (27)).

4.2.5.1 Impacts and Mitigative Measures

The overhead gen-tie line structures are not anticipated to exceed 100 feet in height and the solar facility will have a low-profile nature (i.e., less than 20 feet). Given the heights of the anticipated structures, and the proximity to the nearby towers, the Project is not anticipated to interfere with communication systems. As such, there will be no adverse impacts; therefore, Birch Coulee Solar does not propose mitigative measures.

4.2.6 Aesthetics

The Project is north of State Highway 19, adjacent to and partially within the city of Franklin. The city of Franklin lies between the Minnesota River to the south and agricultural fields to the north. Existing infrastructure in the Site and vicinity include transmission lines and the existing Franklin 115 kV Substation.

Land use in the Site is primarily agricultural, with 97 percent consisting of cultivated crops. The remainder of the landscape consists of minimal tree cover, county drainage ditches running from the northeast

corner of the Site to the southwest boundary and along the southern boundary, farmsteads, and township and county roads.

The topography of the area is flat and gently rolling, and viewsheds in this area are typically broad and expansive, interrupted by farmsteads and their associated residences or the developed area of the city of Franklin. Most structures present are fully or partially surrounded by wooded shelterbelts, resulting in partially obstructed views of the surrounding landscape.

There are 14 residences within 0.25-mile of the Site (Map 5) and north of State Highway 19 (Table 4-4).

Table 4-4 Summary of Residences Within 0.25 Miles of the Site

Residence Location	Distance from Residence to Anticipated Development Area	Vegetative Screening
1	~ 200 feet	Full vegetative screening is present along western and northern perimeter, partial screening along eastern perimeter, and minimal screening to the south, consisting of both mixed deciduous and coniferous trees exists. The Project may be visible to the east and south.
2	~ 250 feet	Extensive vegetation surrounding property to the west and north, consisting of densely packed deciduous trees, will likely screen residence from the Project, particularly in the summer months. Solar arrays south of 660th may be partially visible from the residence.
3	~ 250 feet	Moderate vegetative screening along the western perimeter will provide some visual protection; however, solar arrays may be visible to the east and south of the residence.
4	~ 650 feet	Extensive vegetative screening, consisting of densely packed deciduous trees, along the western perimeter of the property will offer visual protection from the Project to the west. The solar arrays may be visible to the south.
5-9	~ 1,500 feet	All five residences are partially screened by sparse to moderate tree cover. The solar arrays will likely be partially visible to the north and northwest of these residences.
10	~ 500 feet	Consisting of a dwelling and several agricultural buildings, vegetation on the western and norther perimeters provide screening for this property; however, solar arrays may be partially visible to the east of the residence.
11	~2,800 feet	This property, consisting of a dwelling and associated structures, contains some vegetative screening, though solar arrays will likely not be visible given the distance to the Project.
12	~ 1,110 feet	This property consists of a dwelling and associated agricultural structures and is heavily vegetated with mixed deciduous trees on the northern and western perimeters, providing substantial screening. Solar arrays will likely not be visible during summer months when vegetation is fullest.
13	~ 1,500 feet	The property consists of a dwelling and several agricultural buildings; it is heavily vegetated with mixed deciduous trees. Solar arrays will likely not be visible during summer months when vegetation is fullest.
14	~ 1,200 feet	This property, consisting of a dwelling and associated structures, contains substantial vegetative screening, though solar arrays will likely be partially visible to the west.

4.2.6.1 Impacts and Mitigative Measures

Birch Coulee Solar prepared the following renderings to illustrate anticipated viewsheds after construction of the Project at select locations (Map 7).

The Project will alter the current viewshed by converting the agricultural use of the lands. The Anticipated Development Area will be visible from nearby residences and nearby roadways. Minimal trees exist within the Site. However, Birch Coulee Solar designed the Project to avoid tree clearing to the extent practicable, which will help to screen the arrays in some areas. The existing tree cover, as well as the distance from much of the Site, minimizes the viewshed impacts when looking north at the Project from the Minnesota River Valley Scenic Byway (State Highway 19) and the developed areas within the city of Franklin. Based on feedback and preferences provided by adjacent landowners, Birch Coulee Solar may plant pollinator grasses or buffer strips between the Project fence line and residences. Final decisions on screening will be made in consultation with adjacent landowners prior to construction.

The solar panels will take up most of the Anticipated Development Area and along with the fencing, will be the most prominent visible Project component. Given their low profile, the arrays and fencing will be notably less visible from farther distances. Perennial vegetation between the solar panels will also be visible.

PV solar panels use dark, anti-reflective glass panels designed to absorb sunlight to produce electricity. PV solar modules can absorb up to 98 percent of the incoming sunlight depending on the angle of the sun, glass texture and use of anti-reflective coatings. Therefore, during operation there will be little glare from the PV solar modules used for the Project.

Additional Project components that may impact the viewsheds beyond the solar panels include the Project substation and 115 kV gen-tie line. Given the proximity to the existing Franklin 115 kV Substation and existing transmission lines (Map 6), the addition of the Project substation and short 115 kV gen-tie line is not likely to significantly alter the viewshed or increase visual impacts.

Operational lighting is typically pole-mounted and is necessary along the perimeter fencing, at the Project substation, O&M facility, and at entrances/exits for safety and security. However, Birch Coulee Solar will minimize lighting using motion activated, down lit lights, facing away from neighboring properties.

Location 1 Existing Viewshed

Location 1 Visual Rendering

Location 2 Existing Viewshed

Location 2 Visual Rendering

Location 3 Existing Viewshed

Location 3 Visual Rendering

Location 4 Existing Viewshed

Location 4 Visual Rendering

Location 5 Existing Viewshed

Location 5 Visual Rendering

4.2.7 Socioeconomics

Solar projects can impact the socioeconomic conditions of an area in the short term through:

- Influx of non-local personnel
- Creation of construction jobs
- Construction material and other purchases from local businesses
- Expenditures on temporary housing for non-local personnel

This discussion does not address all socioeconomic measures, but instead addresses the most applicable statistics related to the Project: housing, income, poverty, and race.

4.2.7.1 Population and Race

Table 4-5 details population and race characteristics for Camp Township, Bandon Township, Birch Cooley Township, the city of Franklin, Renville County, and Minnesota obtained from the 2022 American Community 5-year Survey. The city of Franklin is 1.08 square miles in size, and the city is an "incorporated place;" therefore, its statistics are separate from the townships and county. Renville County totals approximately 983 square miles. The population of Renville County decreased by 6.5 percent between 2010 and 2020 (reference (28)).

Table 4-5 Population Characteristics

Location	Total Population	Population Density (persons per sq. mile)	Minority Population
Minnesota [1]	5,695,292	71.5	20.3%
Renville County [1]	14,707	15.0	11.9%
City of Franklin [2]	540	537.3	26.5%
Birch Cooley Township [3]	156	3.8	1.9%
Bandon Township [4]	125	3.4	26.4%
Camp Township [5]	143	3.4	4.2%

[1] reference (28)
[2] reference (5)
[3] reference (29)
[4] reference (30)
[5] reference (31)

Renville County is part of the Minnesota Department of Employment and Economic Development (DEED) Region 6E, which is part of the broader Central Economic Region. The region is comprised of Kandiyohi, McLeod, Meeker, and Renville counties. Although Renville County's population decreased between 2010 and 2020, the region experienced an overall population increase between 2020 and 2022. Specifically, the region experienced more births than deaths resulting in a natural increase in population which was offset for a net loss of 48 people due to people moving out of the region (reference (32)). In the same period, the region's population increased by 321 people from international in-migration (reference (32)).

In comparison to the state and county, the townships have lower population density, and the city of Franklin has significantly (more than seven times) higher population density. Bandon Township and the city of Franklin have higher minority population percentages than the state of Minnesota, while Birch Cooley Township and Camp Township have a lower minority population than the surrounding areas and the state.

4.2.7.2 Housing

According to the 2022 American Community Survey 5-year Estimates, there are over a thousand vacant housing units in Renville County but only three in the city of Franklin (Table 4-6). Over 20 percent of the available housing units in the townships are vacant (Table 4-6). When considering an average household size, there is adequate housing available in Renville County but limited vacant housing in the city of Franklin.

Table 4-6 Housing Characteristics

Category	Total Households	Total Housing Units [1]	Total Occupied Housing Units	Total Vacant Housing Units
Birch Cooley Township	70	85	70	15
Bandon Township	57	76	57	19
Camp Township	62	83	62	21
City of Franklin	202	205	202	3
Renville County	5,876	6,950	5,876	1,074
Minnesota	2,256,126	2,547,867	2,322,190	225,677

[1] Source: reference (33).

4.2.7.3 Income and Poverty

DEED data for Region 6E indicates unemployment rates have closely tracked the state's rate over time and is a net labor exporter with more workers driving into the nearby St. Cloud and Twin Cities areas. Over 13% of the jobs in the region are in production, which is almost twice as concentrated compared to the state as whole. The highest location quotient (5.9) was for farming occupations, meaning these jobs are more than 5 times more concentrated in Region 6E compared to the state (reference (32)).

Approximately half (51%) of the population over the age of 16 in Renville County is employed within the Educational Services and Health Care and Social Assistance industry (23.1 percent), the Manufacturing industry (16.4 percent), and the Agricultural industry (11.9 percent) (reference (34)).

Table 4-7 provides income, poverty, and employment levels from the 2022 American Community Survey 5-year Estimates. The townships, city of Franklin, and the county all have unemployment rates lower than the state of Minnesota. Birch Cooley and Bandon Townships have poverty levels that are below the state average; Camp Township and the city of Franklin have poverty levels that are above the state above. Per capita income is lowest in the city of Franklin and Renville County as a whole.

Table 4-7 Income and Poverty

Category	Per Capita Income ($)	Unemployment Rate (population over 16 years) (%)	Persons Living Below Poverty Level (%)
Birch Cooley Township	51,028	1.4	2.6
Bandon Township	50,142	0.0	1.6
Camp Township	43,941	0.8	11.2
City of Franklin	28,216	1.0	18.8
Renville County [1]	34,554	1.9	10.4
Minnesota	44,947	2.2	9.3

[1] reference

4.2.7.4 Impacts and Mitigative Measures

The Project will result in socioeconomic benefits to participating landowners, local governments, and communities. The Project will support up to 300 jobs during the construction and installation phases, and 3 permanent full-time jobs during operation of the Project. Full-time field technicians typically reside within a 30-minute drive of the Site. Birch Coulee Solar will seek to fill local positions with qualified candidates from the surrounding communities to the extent possible. Construction of the Project will provide a temporary increase in revenue to local businesses, due to an increased demand for lodging, food services, fuel, transportation, and general supplies. There are limited restaurants and temporary lodging in the immediate vicinity of the Project. Therefore, temporary construction workers may need to travel to nearby hotels in the city of Morton or on the Lower Sioux Indian Community Reservation. There is adequate housing in the county for operational employees, but potentially not in the city of Franklin.

The Project anticipates paying construction workers in accordance with the prevailing wage and apprenticeship rules under the Inflation Reduction Act. The use of union labor is being considered and will be determined closer to construction. Lease agreement payments and purchase option payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production. The Project will generate an estimated 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 local jurisdiction revenue. Note these figures may increase or decrease as real property taxes are dependent on assessed value and local jurisdiction budgeting. Based on these positive socioeconomic impacts, Birch Coulee Solar does not propose additional mitigative measures.

4.2.8 Environmental Justice

Environmental justice (EJ) refers to the fair treatment and meaningful involvement of communities of color, Indigenous communities, and low-income communities (reference (35)). In general, the intent of EJ is to hold that all people benefit from equal levels of environmental protections and have the same opportunities to participate in decisions that may affect their environment or health. Minority and low-income communities may constitute a very small percentage of the total population and/or geographical area.

The MPCA maintains the Minnesota Areas of Environmental Justice Concern Interactive map, which identifies areas of EJ concerns within the state of Minnesota (reference (36)). This tool has data at the county-wide level for environmental and socioeconomic factors related to EJ. The MPCA uses U.S. Census tract data to prepare the mapping.

Minn. Stat. § 216B.1691, subd. 1(e) was recently updated to include the following definition of “environmental justice area.” Although this statute is not directly applicable to the Project, the definition provides a different methodology for assessing EJ areas nearby. The statute defines an EJ area as an area in Minnesota that, based on the most recent data published by the U.S. Census Bureau, meets one or more of the following criteria:

- 40 percent or more of the population is nonwhite
- 35 percent or more of the households have an income at or below 200 percent of the federal poverty level
- 40 percent or more of the population over the age of five has limited English proficiency

- Located within Indian Country, as defined under United States Code, title 18, section 1151

Census tract 7906, containing the Site, reports 1.34 percent (with a +/- 0.74 percent margin of error) residents with limited English proficiency, 19.31 percent (with a +/- 6.01 percent margin of error) are people of color, and 33.33 percent (with a +/- 9.38 percent margin of error) reported income less than 200 percent of the federal poverty level (Table 4-8). The Site is not within the exterior boundaries of a federally recognized tribal reservation/community. Based on this data, the Site is not within an EJ area, as defined by Minn. Stat. § 216B.1691, subd. 1(e). However, because tract 7906 is within the margin of error with respect to the criterion related to the federal poverty level, Section 4.2.8.1 below nonetheless discusses potential Project impacts and mitigative measures.

Table 4-8 Environmental Justice Data for Census Tracts

Location	Population [1]	Percent Limited English Speaking	Percent Below 200 Percent of Federal Poverty Level	Percent Total Minority
Census Tract 7906	2,737	1.34	33.33[2]	19.13
Renville County	14,723	0.3	26.89	10.9
Minnesota	5,706,494	2.2	22.5	22.5

[1] The population data that is used in the MPCA Environmental Justice Mapping tool is taken from the 2017-2021 American Community 5-year Survey.

[2] Given the +/- 9.38% error reported within the MPCA mapping tool, this tract is mapped as an EJ area for exceeding the following threshold: 35 percent or more of the households have an income at or below 200 percent of the federal poverty level (reference (36)).

4.2.8.1 Impacts and Mitigative Measures

Based on the data provided by the U.S. Census Bureau and the MPCA, the census tract that includes the Site does not have a minority population greater than 40 percent or have a population greater than 40 percent with limited English proficiency. The Site is not within the boundaries of any federally recognized tribal communities. There is a higher concentration of low-income residents within the census tract. However, the more localized data on income (Table 4-7) suggests there may be less poverty in the Site than in the census tract. Specifically, the per capita incomes in Birch Cooley, Bandon, and Camp Townships are higher than the county. Birch Coulee Solar does not anticipate adverse, disproportionate impacts resulting from the Project. Instead, as discussed in Section 4.2.7, the Project is anticipated to have positive socioeconomic impacts. Likewise, as discussed in Section 4.5.1 and 4.6, the Project is not anticipated to impact air quality and will have positive impacts related to climate change. Therefore, Birch Coulee Solar does not propose additional mitigative measures.

4.2.9 Cultural Values

Cultural values include those perceived community attitudes or beliefs that provide a framework for community unity. One of Renville County's missions is "to keep and enhance the quality of life for our family of citizens through services, stewardship of resources, and shared responsibility" (reference (37)).

Community and regional events focused on ethnic heritage or regionally important industry (e.g., agriculture) are a common expression of cultural values. Solar projects have the potential to impact public participation in community and regional events during construction or operation. Cultural representation in community events in the city of Franklin and nearby vicinity appear to be more closely tied to seasonal events, national holidays, and municipal events than to those based on ethnic heritage. According to the U.S. Census Bureau, most of the population in Renville County and the city of Franklin identifies as White alone, not Hispanic or Latino (Table 4-5).

The biggest seasonal event is Catfish Derby Days, and the city of Franklin is known as Minnesota's "Catfish Capital." This event takes place the fourth weekend in July. The Franklin Lions Club is very active in the area and supports and hosts many fundraising and food-sharing events. Nearby, the Bechyn Czech Festival is held in the city of Bechyn, 17 miles northwest of the city of Franklin. It takes place at St. Mary's Church, with food, dancing, genealogy information, and other activities. The Renville County Fairgrounds are around 16 miles north of the city of Franklin. The fair occurs in August and has ATV barrel racing, an All-American Lumberjack show, a demolition derby, exhibits, 4-H participation, concerts, and more. The Renville County 4-H club is based in the city of Olivia, which is around 20 miles northwest of the city of Franklin. They have 6 community-based 4-H clubs throughout the County focused on youth and agricultural education. Other examples of regional cultural events include Classic Car Roll In, Christmas Caroling, Renville County Market, etc. (reference (38)). Birch Coulee Solar reached out to the Renville County 4-H club to form a partnership for the upcoming year so that the 4-H club can allocate more resources towards teachers and students in the Franklin area. In addition, Birch Coulee Solar is working with the local Women's Civic Club and Franklin Lion's Club to support local events and community restoration projects.

The Lower Sioux Indian Community is a federally recognized Indian tribe in Redwood County, approximately two miles south of the city of Morton. The Dakota originated in Minnesota and four bands have lived along the Minnesota River: The Mdewakanton and Wahpekute (the "lower bands"), and the Sisseton and Wahpeton (the "upper bands"). The name "Lower Sioux" was placed on the Mdewakanton band and their homeland after the 1851 Dakota land cession treaties. There are around 930 enrolled members, and over half reside on Tribal lands. The Lower Sioux Indian Community government website lists many community-focused events throughout the year, including the annual Wacipi (powwow), Cansa'yapi Food Pantry, Little Crow Spiritual Run, Valentines Day UNITY Bake Sale, 3-Man scramble golf tournament, learning events, and other holiday events.

4.2.9.1 Impacts and Mitigative Measures

Construction and operation of the Project will not impact public participation in the regional community cultural events described above. Birch Coulee Solar is actively contacting local organizations, including the Renville County 4-H club, Franklin Lions' Club, and Women's Civic Club to foster partnerships with the community. The Project will not cause adverse impacts to cultural values in the area; therefore, Birch Coulee Solar does not propose mitigative measures.

4.2.10 Recreation

Renville and Redwood Counties, both of which are within a five-mile radius of the Site, provide a variety of recreational opportunities such as hiking, fishing, hunting, camping, snowmobiling, cross country skiing and nature viewing. Public lands often provide opportunities for recreational activities. There are no public lands within the Site (Map 8). However, there are public opportunities for recreational activities south of the Site along and near the Minnesota River. These include:

- The Minnesota River Valley Scenic Byway, which is north of the Minnesota River
- The Franklin Public Water Access Site which provides a boat ramp and vehicular parking to allow for access to the Minnesota River, is approximately 1 mile south of the Site (reference (39))
- The Minnesota River, 1 mile south of the southern boundary of the Site, is part of the Minnesota River State Water Trail. The segment directly south of the Site is the Morton to Cambria segment. The DNR recommends day trips for paddlers starting at the Franklin City Park to the Mack Lake

Park. This stretch is described as an easy, winding bit of river, surrounded by trees and nearly uninterrupted by roads or other man-made obstructions (reference (40))

- The Cedar Mountain Wildlife Management Area (WMA) is approximately 1.5 miles south of the Site. WMAs are lands protected for wildlife production, public hunting, trapping, fishing, and other recreational activities. The Cedar Mountain WMA consists of two tracts. The northern tract consists of restored prairie and crop fields; it supports pheasants and grassland bird species, as well as deer and turkeys coming out of the adjacent woods to feed. The southern tract consists of maple basswood forest with bur oak at the top of the south ridge; it provides excellent habitat for turkeys, deer, squirrels, and nongame forest species (reference (41))

- The Cedar Mountain Scientific Natural Area (SNA) is approximately 1.5 miles south of the Site and adjacent to the Cedar Mountain WMA. The goals of the SNA program are to preserve Minnesota's natural heritage and to protect and preserve those natural features that possess exceptional scientific or educational value (reference (42)). The SNA does not have managed trails but does provide for opportunities for bird and wildlife watching and photography (reference (43))

Within the city of Franklin, there is a softball field and a school with a playground as well as a free campground adjacent to the Minnesota River.

There is a snowmobile trail that runs within the Site that is adjacent and parallel to existing roadways including: 670th Avenue (east/west), 400th Street (north/south), and 660th Avenue (east/west) (Map 8). Renville County Drift Runners maintain the snowmobile trail.

4.2.10.1 Impacts and Mitigative Measures

Construction and operation of the Project is not likely to impact public access to, or enjoyment of, nearby recreational opportunities during construction or operation of the Project due to their distance from the Site. The snowmobile trail is close to the Site but outside of the Anticipated Development Area and therefore will be outside of the fence line. Birch Coulee Solar notified the local snowmobile trail club of the Project to confirm no adverse effect, and the snowmobile club did not anticipate any issues. The Project will not cause adverse impacts to recreation in the area; therefore, Birch Coulee Solar does not propose mitigative measures.

4.2.11 Conservation Easements

The Project avoids lands in conservation programs or with conservation easements (Map 8). The closest identified conservation easements include a Conservation Reserve Enhancement Program (CREP) property directly south of the Site and a Reinvest in Minnesota (RIM) Reserve Program property approximately 0.3 mile to the west of the Site (Map 8). In addition, participating landowners have enrolled lands in the Conservation Reserve Program (CRP) immediately adjacent to County Ditch 109A and Judicial Ditch 14-23, which the Anticipated Development Area avoids due to the setbacks from drainage ditches.

The CREP is an offshoot of the CRP, a land conservation program established by the U.S. Department of Agriculture (USDA) and administered by the Farm Service Agency. The program pays farmers a yearly rental fee for agreeing to take environmentally sensitive land out of agricultural production to improve environmental health and quality (reference (44)). The same land is also enrolled into a state-funded perpetual conservation easement through the RIM Reserve program, administered by the Minnesota

Board of Water and Soil Resources (BWSR). Minnesota implemented the CREP to target high-priority conservation issues by offering payments to farmers and agricultural landowners to retire environmentally sensitive land. Lands within the RIM remain private while advancing the state's efforts to improve water quality by reducing soil erosion, phosphorus, and nitrogen loading, as well as improving wildlife habitat and flood attenuation (reference (45)). Enrollment is voluntary and participation in the program comes with certain restrictions on the types of development allowed on parcels enrolled in the program if such development is inconsistent with the conservation goals of the program.

4.2.11.1 Impacts and Mitigative Measures

No CRP, CREP, or RIM parcels are within the Anticipated Development Area (Map 8). The closest conservation easements are directly south of the Site and immediately adjacent to County Ditch 109A and Judicial Ditch 14-23. Birch Coulee Solar does not anticipate direct impacts to these conservation easements. Birch Coulee Solar will develop a SWPPP for the Project that outlines erosion and sediment control measures necessary during construction to minimize the potential for sedimentation to sensitive resources such as the adjacent CRP/CREP land.

4.2.12 Public Service and Infrastructure

Public services are those typically provided by a government entity to its citizens to benefit public health and safety. Publicly available services and infrastructure in the vicinity of the Project include emergency response, roadways, sewage and water, solid waste disposal, and utilities. Section 4.2.1 summarizes Emergency services and Section 4.2.15 summarizes public roads.

In Renville County, most rural residences have water supply wells. The city of Franklin provides municipal water, solid waste disposal, and sewer services within the municipality. Most residences in rural areas throughout the Project vicinity have private septic systems and/or drain fields.

Xcel Energy provides electricity in Renville County. Xcel Energy owns the existing 115 kV transmission line within the Site and west of the anticipated location of the Project substation (Map 6).

As noted on Map 6, there are no known pipelines within the Site or in the surrounding 1-mile radius.

4.2.12.1 Impacts and Mitigative Measures

Birch Coulee Solar does not anticipate using sewer or water services provided by the city of Franklin. It is more likely a well and septic system will be installed to provide services to an O&M facility (if on-site) during operation. However, if a need for city water is necessary during a later design phase, Birch Coulee Solar will coordinate with the city of Franklin. The Project will generate solid waste during construction. The contractor will manage and dispose of solid waste according to applicable requirements.

Birch Coulee Solar will coordinate with Gopher State One Call before and during construction to confirm buried utility locations. Final Project design will avoid impacts to overhead utilities. Limited, temporary impacts to electrical service may be unavoidable during interconnection; however, these impacts will be short-term, and Birch Coulee Solar will coordinate with local individuals and utilities prior to any temporary shutdowns.

The Project will not result in permanent impacts to public services and infrastructure; therefore, Birch Coulee Solar does not propose mitigative measures.

4.2.13 Zoning and Land Use

The primary regulatory approval required for the construction and operation of the Project is a Site Permit issued by the PUC. Pursuant to Minn. Stat., § 216E.10, subd, 1, a Site Permit "supersedes and preempts all zoning, building or land use rules, regulations or ordinances adopted by regional, county, local and special purpose governments." Therefore, Birch Coulee Solar does not require approvals from local zoning authorities. Nonetheless, Birch Coulee Solar considered local zoning ordinances in designing the Project where practicable. For example, setbacks were considered as discussed below. The Project is within Renville County, with a small portion of the Project also within the city of Franklin. Both Renville County and the city of Franklin have adopted renewable energy ordinances, which are discussed in more detail in this section.

Table 4-9 provides a summary of governing bodies within and adjacent to the Site and their respective comprehensive plans.

Table 4-9 Site Local Government Units

Governing Body	Name of Plan	Year Adopted	Associated Development Plans
Renville County	Renville County Comprehensive Plan	2002	Renville County Comprehensive Plan Revised August 2010 Renville County Land Use Ordinance, Chapter 15, Renewable Energy Regulations Effective date May 1st, 2021
City of Franklin	City of Franklin Zoning Ordinance	2003	Section 3.31 RENEWABLE ENERGY SYSTEMS (Solar) Effective date November 13, 2017
Birch Cooley Township	None Adopted	N/A	Renville County Comprehensive Plan
Bandon Township	None Adopted	N/A	Renville County Comprehensive Plan
Camp Township	None Adopted	N/A	Renville County Comprehensive Plan

Based on the Renville County Zoning Map (reference (46)), the zoning classification within the Project outside of the city of Franklin is agricultural (Map 9) (reference (47)). The current land use is agricultural.

Table 4-10 provides a summary of Renville County's setback requirements for a Commercial Solar Energy Conversion System, defined as all solar energy conversion systems (SECS) that have a direct current (DC) greater than 100 kilowatts (reference (48)).

Table 4-10 Renville County Setbacks

Solar Energy Conversion System Setback Categories	Renville County (Commercial SECS)	Project Setback
Dwelling Sites	200 feet	200 feet
Cemeteries	200 feet	Not applicable (no cemeteries within 200 feet)
Road Right-of-Way	67 feet	67 feet
Drainage Ditch	67 feet	67 feet

County Tile Line	40 feet from centerline (80-foot corridor)	40 feet from centerline (80-foot corridor), apart from access roads and fencing
Side Yard Property Line	20 feet	20 feet, except where the County Drain 109A existing crossing is at the property line.
Rear Yard Property Line	20 feet	20 feet

With respect to the county drain tile setback, the Project design requires installing access roads and fencing across existing county drain tile in portions of the Site. Per discussions with the Renville County Drainage Department, Birch Coulee Solar intends to maintain a 40-foot setback between panels and county drain tile and allow access to the Renville County Drainage Department to conduct ongoing maintenance work on county drain tile. Birch Coulee Solar will continue discussions with the Drainage Supervisor as the Project progresses.

With respect to the side yard property line, Birch Coulee Solar is assessing the feasibility of using the existing County Drain 109A crossing during construction and operation of the Project. The existing crossing east of County Road 73 is within 20 feet of the southern property line of parcel 01-01890-00 (Map 2) and may need to be fenced for security.

Birch Coulee Solar received one question during a meeting with the Camp Township board members related to the potential for snowdrifts to affect roadways within the Site. In response, Birch Coulee Solar described the 67-foot setback distance between the Project fence line and the edge of road rights-of-way in the county ordinance, which is expected to be sufficiently wide to avoid impacts on roadways from snowdrifts. Birch Coulee Solar will work with the county and townships to address any concerns regarding potential impacts to roadways.

The portions of the Project within the city of Franklin are zoned as agricultural, highway business district (B2), and low density residential (R1) (reference (49), Map 10)). The current land use for these parcels is agricultural. The Anticipated Development Area overlaps lands zoned for agriculture within the city of Franklin. One temporary laydown yard may partially overlap the areas zoned for the highway business district and residential (Map 10).

The city of Franklin does not have any provisions relating to commercial solar systems but does have a Renewable Energy Systems ordinance that applies to “on-site renewable energy systems”, defined as systems that supply power to an existing use, within the city (reference (49)), Section 3.31 of Franklin Amendment to Zoning Code Title XV: Land Usage). For on-site renewable energy systems, the city requires a 25-foot setback from property lines in an agricultural district.

4.2.13.1 Impacts and Mitigative Measures

The layout for the Project is consistent with the Renville County zoning ordinance and comprehensive plan for development. In the city of Franklin, the location of the Project will not limit the continued agricultural use of the surrounding area, nor will the Project limit use of the surrounding parcels.

The Project received feedback from an individual council member at the Project’s initial open house meeting in October 2023 regarding potential impacts on northward development of the city. Birch Coulee Solar understood the concern to confirm that the parcel zoned as low-density residential (R1), and highway business (B2) could be developed. Following the open house, Birch Coulee Solar excluded the parcel from the operational footprint of the Project. Birch Coulee Solar proposes a temporary use of this parcel for Project construction (Map 10). Despite its zoning classification, the parcel is currently in

agricultural use and is closest to existing residences on the north side of State Highway 19. On April 8, 2024, Birch Coulee Solar attended the monthly City Council meeting and presented Project information, including the proposed temporary use of the R1 and B2 zoned parcel. The City Council indicated a preference for maintaining native prairie vegetation within the parcel during operation of the Project. Birch Coulee Solar will continue to coordinate with the City Council. The Project will not impact future zoning, land use or development in the surrounding area.

4.2.14 Property Values

Real property is unique. The market value of real property is influenced by a myriad of factors, including macroeconomic factors and more localized or parcel-specific variables. For example, national, regional, and local market trends are likely to impact a property's market value, as does the availability and terms of financing. Matters such as the quality of schools, parks, public transportation, and other amenities also play a role. Likewise, property-specific factors, including a property's size, condition, productivity, zoning, and existing encumbrances play a role in its value as well. Ultimately, no single factor determines a property's market 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 from additional or new variables, such as a change in land use on property the landowner considers nearby, is often a deeply personal comparison of the property "before" and "after" the potential change. Often, these deeply held, personal judgments or "stated preferences" provide a useful tool for understanding sentiment. The actual behavior of market participants (e.g., buyers and sellers) as evidenced in sales data, or "revealed preferences," however, is often different than those stated preferences (reference (50)).

4.2.14.1 Impacts and Mitigative Measures

It is understood that the presence of an electrical generating facility has the potential to impact property values. These impacts may be either positive or negative, but are dependent upon the relationship between all the variables that affect a property's market value. Attempting to account for all factors, and to isolate only the impacts from a potential project is difficult. Potential negative effects may result from impacts that extend beyond a project's operating location. This can happen where emissions, noise, or visual impacts extend beyond a project's footprint. A solar project's impacts are lesser relative to more conventional generation facilities that includes large buildings, smokestacks, and the like. There will not be emissions, and noise is anticipated to be minimal during a solar project's operational phase. And, while some aesthetic impacts are anticipated, a solar project's low vertical profile compared with other generating plants limits the extent of those impacts, too.

There are a limited number of studies performed exploring whether and/or to what degree solar facilities may have an impact on property values. The findings of the studies vary, but generally support a conclusion that there is a potential for impacts upon property values, but also that there is not necessarily an impact or an impact to any degree in all circumstances (reference (51)). Accordingly, significant negative impacts to property values in the Project vicinity are not anticipated, though there is the potential for impacts to the value of specific properties within the Project vicinity based on several site-specific considerations.

Birch Coulee Solar will minimize impacts to property values by reducing aesthetic impacts based on preferences of adjacent landowners, implementing restoration and vegetation management BMPs, and reducing impacts to future land use or development in the surrounding area. Based on feedback and preferences provided by adjacent landowners, Birch Coulee Solar may plant pollinator grasses or buffer

strips between the Project fence line and residences. Birch Coulee Solar will make final decisions on screening in consultation with adjacent landowners prior to construction.

4.2.15 Transportation

Transportation resources within and near the Project include several county/townships roads and highways (Map 6). Roads adjacent to or bisecting the Site include:

- County Road 73 / 400th Street which runs north to south through the center of the Site
- County State Aid Highway 5 which runs north to south along the westernmost portion of the Site
- Minnesota State Highway 19 which runs east to west, immediately south of the Site
- 670th Avenue which is a township road and runs east to west along a portion of the northernmost border of the Site
- 660th Avenue which is a township road and runs east to west along a portion of the southern third of the Site

Table 4-11 summarizes the Average Annual Daily Traffic (AADT) counts based on the DOT Traffic Mapping Application (reference (52)). AADT counts are not available for the township roads within the Site.

Table 4-11 Average Annual Daily Traffic Within or Adjacent to the Site

Roadway	Year	AADT Traffic Volume Total
County Road 73/400th Street	2011	60
County State Aid Highway 5	2019	650
Minnesota State Highway 19	2021	2,128

There are no railroads within the Project. The closest railroad runs east to west through the city of Franklin (Map 6). Minnesota Prairie Line, Inc, whose parent railroad is Twin City & Western Railroad, owns and operates this railroad (reference (53)).

There are no FAA-registered airports within 5 miles of the Project. The closest airport to the Project is Redwood Falls Municipal Airport (10.9 miles west). No private airstrips are within 5 miles of the Site (reference (54)).

4.2.15.1 Impacts and Mitigative Measures

Birch Coulee Solar will secure the appropriate local permits for road access and other aspects of the Project. Coordination with the appropriate road authority will happen for planned work within the road rights-of-way to support the Project utility installation. Birch Coulee Solar is not proposing changes to existing roadways. Access to the Project will be from existing state, county, and township roads, with the possibility of minor field access. A traffic control plan in consultation with Renville County and the city of Franklin will be developed prior to start of construction.

The Project will temporarily impact public roadways during construction. The impacts primarily result from additional traffic and the potential for slow-moving construction vehicles. Slow-moving vehicles during construction have the potential to cause some delays but will be minimal and in a relatively short period of

time. The number of vehicles travelling to and from the construction site per day will fluctuate throughout the construction period. During peak construction, there could be up to 300 people at the Project. Traffic during the 12-18 months of active construction will be an average of approximately 20-100 pickup trucks, cars, and/or other types of employee vehicles onsite daily, with approximately 10-20 semi-trucks per day for delivery of facility components. Semi-truck delivery varies depending on phase of construction and delivery timeline of equipment. While construction will create an increase in local traffic, the increase will not have an impact on the functional capacity of the local roads. The functional capacity of a two-lane paved rural highway is more than 5,000 vehicles per day; therefore, the surrounding roads will continue to be well below capacity (reference (55)). Finally, as noted in Section 3.5, Birch Coulee Solar will work with Renville County and the city of Franklin to develop a traffic control plan prior to construction to minimize the impact of vehicular traffic on the local area.

If overweight or oversize loads are necessary, Birch Coulee Solar will obtain the appropriate approvals prior to construction. In particular, the one-time delivery of the largest piece of equipment, the generator step-up transformer (GSU), typically involves traffic control measures that may include localized temporary road closures for one day. Construction equipment movement on or across roads will be minimized and conducted in accordance with DOT requirements. Once construction is complete, traffic impacts will be negligible. During the operations phase, a small maintenance crew will use pickup trucks on a regular basis to monitor and maintain the facilities.

The Project construction or operation will not impact existing railroads.

Birch Coulee Solar used the FAA's Obstruction Evaluation/Airport Airspace Analysis Notice Criteria Tool to determine if further aeronautical study or FAA filing is necessary. The tool generated a "no notice required" result for the solar panels, construction cranes up to 150 feet, electric transmission poles/towers up to 150 feet, or communications towers up to 150 feet. As a result, no 7460-1 forms are anticipated to be necessary for the permanent Project facilities (reference (54)). Although unlikely, Birch Coulee Solar will determine closer to construction if cranes taller than 150 feet will be required that will necessitate filing with the FAA. Making the requisite filing, if necessary, is not expected to impact the Project schedule.

4.3 Land-Based Economies

The following sections describe the land-based economies of the Site and the potential impacts of the Project on land-based economies, including agriculture, forestry, tourism, and mining.

4.3.1 Agriculture

Approximately 624,114 acres (99.2 percent of the 629,056 acres that comprise Renville County) are farmland. There are a total of 1,026 individual farms in Renville County with an average farm size of 608 acres. The market value of agricultural production in Renville County in 2017 was approximately 609 million dollars. By sales type, 61 percent of sales in Renville County are crops (including grains, oilseeds, dry beans, dry peas, vegetables, and hay) and 39 percent of sales are for livestock and poultry. Hogs and pigs are the top livestock inventory in Renville County, followed by poultry and eggs, and cattle and calves (reference (56)).

4.3.1.1 Impacts and Mitigative Measures

The Project will temporarily impact up to 1,041.6 acres of agricultural land during construction and operations. This constitutes 0.2 percent of the agricultural land in Renville County. The revenue lost from removing land from agricultural production will be offset by the leases with the landowners. Birch Coulee

Solar conducted a Prime Farmland Analysis to demonstrate the absence of a feasible and prudent alternative (Appendix E). Furthermore, Birch Coulee Solar prepared an AIMP (Appendix D) and a VMP (Appendix F) to minimize Project impacts such as soil compaction, topsoil mixing, soil erosion, spread of invasive and noxious weed species, and rutting.

4.3.2 Forestry

There are no forestry operations or heavily wooded areas in the Site. Section 4.5.6 discusses the limited wooded areas present.

4.3.2.1 Impacts and Mitigative Measures

The Project will not impact forestry land-based economies; therefore, Birch Coulee Solar does not propose mitigative measures.

4.3.3 Tourism

Solar facility projects have the potential to impact tourism through aesthetic changes to the existing landscape or interruption of public access to nearby recreational and tourism opportunities. Tourism in the Site centers around outdoor recreational opportunities along the Minnesota River, described in Section 4.2.10 and various community festivals and events. Other nearby opportunities for tourists include the Jackpot Junction Casino and Hotel and the Birch Coulee Battlefield. The casino is approximately 5 miles to the west of the Project. Beyond gambling, the casino also offers concerts and an onsite RV park (reference (57)). The Birch Coulee Battlefield is north of the city of Morton, approximately 4.5 miles northwest of the Project. The Renville County Historical Society manages the site and offers self-guided trails with markers explaining the battle from both Dakota and U.S. soldiers' perspectives (reference (58)).

4.3.3.1 Impacts and Mitigative Measures

Birch Coulee Solar does not anticipate the need for road closures during active construction apart from the potential for a one-day temporary closure during delivery of the GSU. There are no specific tourism opportunities within the Site. The annual events hosted by the city of Franklin are held within the city limits and not within the Site. Construction of the Project could result in increased use of the lodging facilities (i.e., hotel or RV park) at the Jackpot Junction Casino which while increasing the total count of potential people staying at the hotel, could also have negative impacts on the casino if there is decreased use of the casino by hotel guests. No other impacts to tourism are anticipated during construction. Operation of the Project will not impact tourism opportunities at the Jackpot Junction Casino and Hotel and the Birch Coulee Battlefield. Therefore, Birch Coulee Solar does not propose mitigative measures.

4.3.4 Mining

Renville County is home to multiple mining operations that extract and process materials such as sand, gravel, granite, kaolin clay (used for pottery, paper coating, and other unique applications), and fill or borrow soils (reference (59)). Based on DOT's Aggregate Source Information System (ASIS) data, there are no mining operations within the Site (reference (60)). According to the ASIS data, the closest aggregate pit is 7.5 miles northwest and the closest rock quarry is 4 miles west of the Site.

4.3.4.1 Impact and Mitigative Measures

No mining resources are within or directly adjacent to the Site. Construction and operation of the Project will not impact commercial mining operations; therefore, Birch Coulee Solar does not propose mitigative measures.

4.4 Archaeological and Historical Resources

In Situ Archaeological Consulting (In Situ) conducted a Phase Ia literature review in July 2023 for the Site and a 1-mile study area surrounding it that consisted of:

- Request for data from SHPO
- Review of the Office of the State Archaeologist (OSA) Portal
- Review of the National Register of Historic Places (NRHP) Database review of historic maps and aerial imagery

Within the 1-mile study area, the records check identified three previously recorded archaeological sites (one of which [#21RN0038] is within the Site) and 19 previously recorded historic architectural resources (none of which are within the Site). The identified cultural resources have either been determined ineligible or remain unevaluated for listing on the NRHP.

Three previously recorded archaeological sites are withing in the 1-mile study area (Table 4-12). One resource is an alpha site which is a site that is likely to have archaeological resources but has not been formally investigated by professional archaeologists.

Table 4-12 Archaeologic Sites Within 1 Mile of the Site

Site Number	Location	Site Description	NRHP Eligibility	Within Site
21RN0038	T112N R34W S1	Post-contact Farmstead/Artifact Scatter	Not Eligible	Yes
21RN0051	T112N R34W S2	Precontact/ Lithic Scatter	Unevaluated	No
21RNad	T112N R34W S3	Post-contact/Alpha Site/Trading Post	Unevaluated	No

Nineteen previously recorded historic architectural resources were identified in the 1-mile study area (Table 4-13). Eighteen of these properties have not been evaluated for listing on the NRHP, and one property has been determined not eligible for the NRHP.

Table 4-13 Historic Architectural Resources Within 1 Mile of the Site

Site Number	Address/Location	Site Name/ Description	NRHP Eligibility	Within Site
RN-BCO-002	Off Co. Rd 5	Finn Town	Unevaluated	No
RN-CAM-001	Off MN Hwy. 19	Finnish Lutheran Church	Unevaluated	No
RN-FRC-001	1st Ave. & 3rd St.	Grain Elevator	Unevaluated	No
RN-FRC-002	1st St. & 1st St.	Methodist Church	Unevaluated	No
RN-FRC-003	2nd Ave. & 1st St.	Franklin Fire Hall	Unevaluated	No
RN-FRC-004	2nd Ave. & 1st St.	St Luke's Lutheran Church	Unevaluated	No
RN-FRC-005	2nd Ave.	Commercial Building	Unevaluated	No
RN-FRC-006	2nd Ave. & 3rd St.	State Bank of Franklin	Unevaluated	No
RN-FRC-007	2nd Ave.	Citizens' State Bank	Unevaluated	No
RN-FRC-008	2nd Ave.	Commercial building	Unevaluated	No
RN-FRC-009	2nd Ave. & 4th St.	Commercial Building	Unevaluated	No
RN-FRC-010	490 2nd Ave.	House	Unevaluated	No
RN-FRC-011	505 2nd Ave.	House	Unevaluated	No
RN-FRC-012	555 2nd Ave.	Sacred Heart Church & Rectory	Unevaluated	No
RN-FRC-013	2nd Ave.	House	Unevaluated	No
RN-FRC-014	3rd Ave & 2nd St.	House	Unevaluated	No
RN-FRC-015	3rd Ave & 3rd St.	School	Unevaluated	No
RN-FRC-016	4th St.	House	Unevaluated	No
XX-ROD-041	Red Wing-South Dakota Border	Trunk Highway 19	Not eligible	No

In Situ evaluated the potential for the presence of cultural resources within the Site based on DOT's archaeological predictive model and survey implementation model (reference (61)) in addition to the environmental setting and proximity of previously recorded archaeological site or historic structures.

The Site is on an upland overlooking the Minnesota River Valley. Open ditches transect portions of the Site. Historic maps and aerial imagery show 23 historic map features, including houses and associated structures. Additionally, Kelly Lake, a historic lake that is no longer present, was noted in the northeast corner of the Site. One archaeological site is also present within a portion of the Site. Based on these factors, In Situ determined that portions of the Site have a moderate to high potential for the presence of cultural resources.

Based on the cultural resource potential assessment, In Situ recommended a targeted Phase I cultural resource survey for the Project. Within the areas of moderate/high cultural resource potential, In Situ proposed standard Phase I investigation methods (15 meter spacing of pedestrian survey transects and 15 meter spacing between shovel tests), as outlined in the SHPO Manual for Archaeological Projects in Minnesota (reference (62)) and OSA's State Archaeologist's Manual for Archaeological Projects in Minnesota (reference (63)), with reducing the spacing of transects and shovel tests in areas of high potential based on the recommendation of the Principal Investigator. Within the areas of low cultural resource potential, In Situ proposed wider pedestrian survey transects and shovel test spacing, up to 30 meters, to verify the absence or presence of any cultural resources. On October 20, 2023, SHPO issued a letter that concurred with the cultural resource potential assessment as well as the proposed methodology for the archaeological survey for the Project (Appendix H).

In Situ conducted a Phase I archaeological survey of the Site in November 2023 (Appendix I). This survey entailed surface collection for most of the Site and shovel test unit excavation for 16 acres of the Site. Visual inspection occurred within areas of slope, wetlands, and previous disturbance (approximately 5 acres). In Situ revisited one previously recorded cultural resource, historic Euro-American farmstead/artifact scatter site 21RN0038, during the archaeological survey and found it was destroyed by

the construction of a substation and as a result, no further work was recommended for this resource for this Project (Appendix I). Birch Coulee Solar provided the Phase I Archaeological Investigation report to the SHPO on March 15, 2024, to request concurrence. The SHPO provided concurrence on May 3, 2024 (Appendix H).

Traditional Cultural Specialists (TCS) with the Lower Sioux Community Tribal Historic Preservation Office (THPO) and the Upper Sioux Community THPO accompanied In Situ during the field survey. TCS staff with the Lower and Upper Sioux Community THPOs recorded and documented three culturally sensitive areas of Tribal concern within the Site. The assessment details of these areas are on file with the THPOs. These areas of Tribal concern are considered potential traditional cultural properties, but are not archaeological sites, as no physical archaeological evidence of a site was found during the survey of these locations. Therefore, In Situ did not prepare and submit archaeological site forms for the three areas of Tribal concern to the OSA.

4.4.1.1 Impacts and Mitigative Measures

No known archaeological or historical resources are within the Site. Birch Coulee Solar shared the archaeological survey report with the Lower Sioux and Upper Sioux Community THPOs and received feedback from the Lower Sioux THPO in January 2024 which was incorporated in the Project design. Birch Coulee Solar is continuing to coordinate with the Lower and Upper Sioux Community THPOs regarding measures to avoid and/or minimize potential impacts to the culturally sensitive areas of Tribal concern identified within the Site. In addition, prior to construction, Birch Coulee Solar will prepare an Unanticipated Discoveries Plan that will describe procedures to implement if previously unrecorded cultural resources or human remains are encountered during construction of the Project.

4.5 Natural Environment

4.5.1 Air Quality

4.5.1.1 Existing Air Quality

The Clean Air Act (CAA) requires the USEPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants, referred to as “criteria pollutants.” The CAA identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children, and the elderly; and secondary standards which are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife, and structures. The six criteria pollutants are (reference (64)):

- Ground-level ozone (O_3)
- Particulate matter (PM_{10}/$PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Nitrogen dioxide (NO_2)
- Carbon monoxide (CO)
- Lead (Pb)

Air quality in the Site presently meets federal air quality standards because Minnesota is currently in attainment for all the NAAQS, except for a portion of Dakota County (approximately 100 miles east of Renville County), which is not in attainment with the 2008 lead standard (reference (65)).

In Minnesota, the MPCA tracks air quality using monitoring stations and uses data from these monitors to calculate the Air Quality Index (AQI), on an hourly basis, for criteria pollutants except Pb. The pollutant with the highest value for a particular hour sets the overall AQI for that hour. The MPCA uses the AQI to categorize the air quality of a region as one of five levels of quality (reference (66)):

- Good
- Moderate
- Unhealthy for sensitive groups
- Unhealthy
- Very unhealthy

The Project is nearest to the air quality monitor in Marshall, Minnesota, approximately 50 miles west of the Project. This station monitors for O_3 and $PM_{2.5}$. Table 4-14 provides the AQI for Marshall, Minnesota for the past five years.

Table 4-14 Days in Each Air Quality Index Category

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2022	324	30	3	2	0
2021	289	65	3	2	0
2020	330	30	0	0	0
2019	326	35	0	0	0
2018	333	32	0	0	0
2017	329	31	0	0	0

Source: reference (67)

The AQI results in Marshall, Minnesota show primarily good air quality days where concentrations of O_3 and $PM_{2.5}$ are low. Moderate days are the second most common results. The AQI was considered unhealthy for sensitive groups for three days in 2022 and two days were unhealthy. The days considered unhealthy in 2022 were likely due to Canadian wildfire smoke. There were zero days in the last five years where the air quality was very unhealthy. These categories are more common in highly populated areas due to an increase of sources that contribute to the AQI, such as cars, trucks, and industry.

4.5.1.2 Impacts and Mitigative Measures

Minor temporary effects on air quality may occur during construction and primarily consist of emissions from construction equipment and other vehicles, and from fugitive dust generated from surface activities. Fugitive dust may be generated from vehicles or equipment traveling on roads that are unpaved or have fine-textured soils present that can become windborne. The following influence the amount of fugitive dust released:

- Level of construction activity

- Road surface characteristics
- Soil type
- Soil moisture content
- Wind speed
- Precipitation
- Vehicle characteristics like weight and speed

Dust emissions are greater during dry periods and in areas where fine-textured soils are subject to surface activity. If construction activities generate problematic dust levels, Birch Coulee Solar may employ construction-related practices such as:

- Applying water or other commercially available dust control agents on unpaved areas subject to frequent vehicle traffic
- Reducing the speed of vehicular traffic on unpaved roads
- Covering open-bodied haul trucks
- Containing excavated material
- Protecting exposed soil
- Stabilizing soil
- Treating stockpiles

By applying standard best management practices, adverse effects on the surrounding environment are anticipated to be negligible because of the short and intermittent nature of the emission and dust-producing construction phases.

Weather conditions and the type of construction activity generally influence the magnitude of exhaust emissions during construction. Air emissions from Project construction activities will likely include primarily CO_2, nitrogen oxides, and PM. Exhaust emissions, primarily from diesel and other carbon-based fueled equipment, will vary with the phase of construction are discussed in Section 4.7 and Appendix K. Birch Coulee Solar will minimize emissions from construction vehicles by using modern equipment with lower emissions ratings and properly functioning exhaust systems. Adverse effects on the surrounding environment will be negligible because of the short and intermittent nature of the emission producing construction phases.

After the construction phase, wind-blown fugitive dust emissions will be lower than current or historic emissions because the establishment of perennial native plantings will reduce exposed soils. While maintenance vehicles traveling on gravel access roads may generate some fugitive dust, it will be minimal as compared to active agricultural practices, temporary, and infrequent throughout the year.

The Project will have an overall effect of improving air quality by replacing electrical generation produced from the burning of fossil fuels. This is expected to reduce both harmful greenhouse gas (GHG) emissions and other pollutant emissions detrimental to air quality. Additionally, since agricultural

operations at the Project site will no longer occur during construction and operation of the facility there will be a reduction in particulate emissions, wind-blown dust emissions, and farm equipment exhaust, which will further improve air quality at and in the vicinity of the site. Following construction, the facility will not directly emit air pollutants.

4.5.2 Geology

Bedrock geology of the Site consists of undifferentiated upper Cretaceous rock which consists of mostly clay and shale with less abundant sandstone and minor lignite. The Site may also overlie the Morton granite-rich migmatite gneiss in the Minnesota River Valley subprovince of west-central and southwestern Minnesota. Depth to bedrock is anticipated to be greater than 100 feet below ground surface (reference (68)).

Regional surficial geology consists of diamicton or unsorted sediment with a fine-grain matrix (sand-sized and smaller particles) which may contain clasts of gravel, scattered cobbles, and rare boulders. The Site includes diamicton of the Heiberg member of the New Ulm Formation which may have a loam matrix texture and a yellowish-brown color where oxidized, while the unoxidized matrix may have a dark gray color. This diamicton may form irregular uplands within complex terrain with low to moderate relief ranging from 20 to 50 feet. Portions of surficial geology within the Site may also have washed till capped with coarse-grained lag resulting from the removal of finer-grained particles.

There are no karst features within the Site. The nearest karst feature is a stream sink approximately 12 miles west of the Site (reference (69)).

4.5.2.1 Impacts and Mitigative Measures

Birch Coulee Solar will complete a geotechnical investigation prior to final design and will confirm if any shallow bedrock is present. If areas with shallow bedrock and/or isolated near-surface obstacles (glacial boulder) are present, Birch Coulee Solar may use concrete foundations instead of driven piles, depending on site specific soil conditions and the findings of geotechnical analysis.

4.5.3 Groundwater Resources

The Site is in the Western Province (Province 5) of Minnesota's Groundwater Provinces. Water availability in the Western Province is moderate in surficial sands and limited in buried sands. Province 5 often contains fractured bedrock commonly buried deeply beneath glacial sediment which limits its use as an aquifer. The Western Province has limited bedrock aquifers and groundwater mostly occurs in smaller fractures that may not yield useable quantities of water (reference (70)). The groundwater flow direction in these shallow, unconsolidated sediments is expected to follow surface topography and surface water flow. However, the groundwater flow direction may vary throughout the Site depending on factors such as the presence of shallow bedrock, underground utilities, and/or other surficial features. The depth to the water table is approximately 0 to 20 feet below ground surface in the Site (reference (71)).

4.5.3.1 Sole Source Aquifer (SSA)

The USEPA defines a sole source aquifer (SSA) or principal source aquifer area as (reference (72)):

- One that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer

- Where contamination of the aquifer could create a significant hazard to public health
- Where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer

There are currently no USEPA-designated SSAs in the Project vicinity (reference (72)).

4.5.3.2 Minnesota Well Index (MWI)

Based on review of publicly available well records from the MDH MWI (reference (73)), there are no water wells within the Site. Among wells in the MDH database within one mile of the Site (which include private, sealed, and other wells), static water level ranges from 20 to 60 feet below ground surface.

4.5.3.3 Wellhead Protection Areas

The Wellhead Protection Area program administers the public and non-public community water supply source-water protection in Minnesota. Wellhead Protection Areas are 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. Wellhead Protection Areas 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 (reference (74)). The viewer also includes the Drinking Water Supply Management Areas (DWSMA) and DWSMA Vulnerability. DWSMAs are delineated areas within the Wellhead Protection Area and are managed in a wellhead protection plan, usually by a city. According to the viewer, a Wellhead Protection Area and DWSMA are within the southern portion of the Site. The DWSMA vulnerability is designated as very low.

4.5.3.4 Special Well and Boring Construction Areas

A Special Well and Boring Construction Area, or well advisory, is a mechanism which provides for controls on the drilling or alteration of public and private water-supply wells, and environmental wells in an area where groundwater contamination has, or may, result in risks to the public health. There are no MDH-designated Special Well and Boring Construction Areas in Renville County (reference (75)).

4.5.3.5 Impacts and Mitigative Measures

There are no designated SSAs within the Site. However, a Wellhead Protection Area and DWSMA are within the southern portion of the Site (Map 12). The DWSMA vulnerability is designated as very low. During construction, Birch Coulee Solar will store materials including fuel and gasoline in sealed containers to prevent spills, leaks, or other discharges in accordance with the SWPPP. After construction activities are complete, Birch Coulee Solar will restore the Site disturbed during construction as described in the VMP (Appendix F). Minnesota solar projects are considered semi-impervious in nature. An increase in impervious surfaces has the potential to increase stormwater runoff and, in turn, reduce groundwater recharge. Birch Coulee Solar will manage surface water that flows or falls onto impervious surfaces in accordance with conditions of the MPCA stormwater permit.

There are no water wells within the Site; the nearest well is a private well associated to Residence 3 (Map 5). The Solar Facility will be at least 200 feet from the nearest occupied residence, thereby minimizing the risk of impacts on private wells. Birch Coulee Solar will assess any wells identified within the Site during construction to determine if they are open, and seal them, if necessary, in accordance with MDH requirements.

Construction of the Project is not likely to require subsurface blasting and disturbances to groundwater flow from newly fractured bedrock. If needed, Birch Coulee Solar will discharge any construction trench water to surrounding areas using appropriate BMPs to minimize erosion, and allow it to infiltrate back into the ground in accordance with applicable permits.

The proposed Project substation, where the main transformer and associated aboveground storage tank and secondary containment will be, is outside of the Wellhead Protection Area and DWSMA (Map 12). Birch Coulee Solar will prepare and implement a Spill Prevention, Countermeasures and Control (SPCC) plan for the main transformer at the Project substation to prevent spills or leaks in accordance with USEPA regulations.

4.5.4 Soils and Prime Farmland

Soil characteristics within the Project Site were assessed using the USDA Soil Survey Geographic database (SSURGO) (reference (76)). The SSURGO is a digital version of the original county soil surveys developed by Natural Resources Conservation Service (NRCS) for use with Geographic Information System (GIS) and can be displayed as tables, maps, or for use with GIS. Soil maps are linked in the SSURGO database to information about the component soils and their properties. Map 13 identifies the soil types within the Site and Table 4-15 summarizes the soil properties. The soils within the Site generally include clay loam and loam.

Table 4-15 Soil Types within the Site

Soil Map Unit Name	Acres	Percent of Site	Drainage Class	Hydrologic Soil Group	Compact Prone	Rutting Hazard	Erosion Hazard
102B-Clarion loam, 2 to 6 percent slopes	46.0	4.4%	Moderately well drained	C	Medium	Severe	Slight
112-Harps clay loam, 0 to 2 percent slopes	64.2	6.2%	Poorly drained	C/D	Low	Severe	Slight
118-Crippin loam, 1 to 3 percent slopes	6.7	0.6%	Somewhat poorly drained	B/D	Low	Severe	Slight
1373C-Clarion-Storden-Pilot Grove complex, 6 to 10 percent slopes, moderately eroded	13.1	1.3%	Well drained	B	Medium	Severe	Moderate
1376C-Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded	12.2	1.2%	Well drained	B	Medium	Severe	Moderate
336-Delft clay loam, 0 to 2 percent slopes	13.5	1.3%	Poorly drained	C/D	Low	Severe	Slight
386-Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes	41.4	4.0%	Very poorly drained	C/D	Low	Severe	Slight
519-Klossner muck, depressional, calcareous, 0 to 1 percent slopes	7.4	0.7%	Very poorly drained	B/D	Low	Severe	Slight
86-Canisteo clay loam, 0 to 2 percent slopes	5.2	0.5%	Poorly drained	C/D	Low	Severe	Slight
887B-Clarion-Swanlake complex, 2 to 6 percent slopes	160.5	15.4%	Moderately well drained	C	Medium	Severe	Slight
920B-Clarion-Storden-Hawick complex, 2 to 6 percent slopes	72.0	6.9%	Well drained	B	Medium	Severe	Slight
L107A-Canisteo-Glencoe complex, 0 to 2 percent slopes	392.1	37.6%	Poorly drained	C/D	Low	Severe	Slight
L163A-Okoboji silty clay loam, 0 to 1 percent slopes	43.7	4.2%	Very poorly drained	C/D	Low	Severe	Slight
L83A-Webster clay loam, 0 to 2 percent slopes	20.5	2.0%	Poorly drained	C/D	Low	Severe	Slight
L85A-Nicollet clay loam, 1 to 3 percent slopes	143.0	13.7%	Somewhat poorly drained	C/D	Low	Severe	Slight

7 CFR 657.5(a) defines Prime Farmland as:

> *"land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding."*

Soils meeting the criteria of prime farmland, and/or do not meet the above criteria may still be prime farmland if draining or irrigating addresses the limiting factor.

The NRCS also recognizes farmland of statewide importance, defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply necessary to economically produce sustained high quality or high yields of specific crops. Farmland of statewide importance is like prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate state agencies, typically in association with local soil conservation districts or other local agencies.

The Site is within designated prime farmland (Table 4-16; Map 14).

Table 4-16 Designated Prime Farmland within the Site

Total Acres	Prime	Statewide Importance	If Drained	If Protected	Not Prime
1041.6	356.2	104.7	580.7	0	0

4.5.4.1 Impacts and Mitigative Measures

Solar projects have the potential to impact soils during construction and decommissioning. During construction, grading activities required to provide a level surface for safe operation of construction equipment will impact soils. Soil erosion, compaction, and topsoil and subsoil mixing is possible within temporary work areas.

Based on SSURGO data, soils within the Site are susceptible to severe rutting and most are poorly drained. Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on moisture content and soil texture. Section 3.2.1 and Appendix E provide additional information regarding prime farmlands.

Birch Coulee Solar will implement the following measures to minimize impacts to soils and designated prime farmland:

- The AIMP (Appendix D) describes methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation cover. These measures will help Birch Coulee Solar construct and operate the Project so the land can be returned to its original use (agriculture) after decommissioning.

- The VMP (Appendix F) describes methods to plant and stabilize soil during and after construction. The VMP outlines methodologies for proper vegetation installation, including guidance for site preparation, seeding, and seed mixes. The establishment of perennial vegetation will preserve or improve the soil quality over time, and studies indicate planting pollinator habitat may increase yields of adjacent cropland that relies on insect pollinators (e.g., soybeans, reference (77)).

- Birch Coulee Solar will develop and implement a SWPPP to minimize soil erosion and impacts during construction. The SWPPP will include construction BMPs such as matting to minimize

rutting, silt fencing, temporary seeding/stabilization, and project phasing. The SWPPP will also include permanent stormwater management features as required (e.g., stormwater basins as shown in Map 3).

4.5.5 Surface Waters and Floodplains

The Site is within portions of the Spring Creek-Minnesota River Watershed, which is part of the Minnesota River – Mankato Watershed (major watershed #28). Surface runoff within the Site generally travels south and southwest into open, county-managed drains as the elevation drops toward the Minnesota River (Map 15).

The Renville County Drainage Department provides administration and maintenance services for 769 miles of open drainage channel and 1,368 miles of drain tile (reference (78)). This includes ditch channel maintenance, vegetation and brush control, tile repair, and buffer strip compliance.

The Site is primarily within the County Ditch 109A Watershed and Judicial Ditch 14-23 Watershed (Map 16). County Ditch 109A is an open ditch system that generally traverses through the Site from the northeast corner to the south (Map 16). Judicial Ditch 14-23 is an open ditch system that traverses east/west along the southern boundary of the Site prior to becoming a part of County Ditch 109A. Renville County Drainage Department manages both County Ditch 109A and Judicial Ditch 14-23 and their associated drain tiles within the Site (Map 16). County Ditch 109A eventually flows into Purgatory Creek about one mile to the southwest, which flows into the Minnesota River (Map 17). The westernmost part of the Site is within a separate watershed area that drains to County Ditch 131 (Map 16) and eventually to Purgatory Creek, which flows into the Minnesota River (Map 17). The Project SWPPP will include 50-foot natural buffers outside of surface waters, including the county ditches. If buffers cannot be maintained, redundant perimeter controls will be included in the SWPPP.

Section 303(d) of the Clean Water Act (CWA) requires each state to list streams and lakes not meeting their designated uses because of excess pollutants every two years. There are no impaired waters in the Site; the nearest impaired water is Purgatory Creek, approximately 0.9 miles to the southwest (Map 17). The waterway is listed as impaired in this location for Escherichia coli (“E. coli”) (reference (79)). The Minnesota River is also impaired south of the Site for mercury in fish tissue, nutrients, PCBs in fish tissue, and turbidity. The Project SWPPP will consider the impairments and designations and specify applicable BMPs.

There are no Public Water Inventory (PWI) watercourses or basins in the Site. The closest PWI watercourses are a ditch approximately 0.7 miles northwest of the Site and the Minnesota River approximately 1 mile south of the Site (Map 17).

There are no state designated trout streams or waterbodies identified as prohibited outstanding resource value waters under Minn. R. 7050.0335, subp. 3 within the Site. There are no designated lakes for wildlife management under the authority of Minn. Stat. § 97A.101, subd. 2 or migratory waterfowl feeding and resting lakes within the Site.

There are no Federal Emergency Management Agency (FEMA) 100-year floodplains within the vicinity of the Site (Map 18). The nearest 100-year floodplain is associated with the Minnesota River, approximately 1 mile south of the Site.

On behalf of Birch Coulee Solar, Barr Engineering Co. (Barr) completed a field-based water resources delineation in July 2023. The delineation identified 18 palustrine emergent wetlands (26.3 acres) within

the Site (Map 17, Map 19). Most field delineated wetlands are within tilled agricultural fields, where functioning drain tile is present.

According to the DNR calcareous fen GIS data, there are no calcareous fens within 1 mile of the Site. The nearest known calcareous fen is in Fort Ridgely State Park, approximately 10 miles southeast of the Project (reference (80)).

4.5.5.1 Impacts and Mitigative Measures

Birch Coulee Solar designed the Project to avoid or minimize adverse impacts to surface water resources to the extent practicable. For example, natural buffers will be maintained adjacent to the ditches where possible. Judicial Ditch 14-23 and County Ditch 109A are anticipated to be outside the Project fence line, except for a section of County Ditch 109A that includes an existing ditch crossing that may be used for the Project; as such, Project activities are not anticipated to disturb the drainage ditches. Birch Coulee Solar will continue to work with the Renville County Drainage Department to assess the feasibility of using the existing County Ditch 109A crossing during construction and operation of the Project.

There is potential for temporary impacts to wetlands from ground disturbing activities associated with installation of fence lines. Birch Coulee Solar will implement BMPs such as construction matting and/or potential halting construction activities during wet weather to minimize these temporary impacts. Birch Coulee Solar will meet the 16.5-foot buffer from county-managed drains within the Site (Map 16). No Project components will be within 16.5 feet from top or crown of each of the drains' banks per the Buffer Ordinance (reference (81)).

The Project design avoids permanent impacts to the county ditches. Although Project design will minimize impacts to wetlands to the extent feasible, engineering constraints may necessitate placement of fencing across some wetlands, resulting in minimal permanent impacts. Birch Coulee Solar will obtain any necessary permits for temporary and/or permanent impacts to waterbodies prior to construction.

There is a potential for erosion and sedimentation to occur during ground-disturbing activities associated with Project construction. Birch Coulee Solar will develop and implement a SWPPP that specifies BMPs, such as silt fencing, to minimize sedimentation impacts.

4.5.6 Vegetation

The North Central Glaciated Plains Section of the Prairie Parkland Province historically consisted of tallgrass prairie (reference (4)). Currently, the predominant landcover in the area consists of agriculture.

According to the U.S. Geological Survey National Land Cover Database, most of the Site consists of cultivated crops (Map 11). Additional landcover types represent a very small portion of the Site and consist of developed land, wetlands, deciduous forest, and barren land.

Corn and soybeans represent the dominant crops in the Site and have been for the past ten years (Table 4-17) (references (82); (83); (84); (85); (86); (87)). Map 20 illustrates the crops grown within the Site per USDA's Cropscapes land cover data (sugar beets, corn, and soybeans).

Table 4-17 Dominant Crop Grown Within the Site

Year	Primary Land Cover
2023	Corn
2022	Soybeans
2021	Corn
2020	Soybeans
2019	Corn
2018	Soybeans
2017	Corn
2016	Soybeans
2015	Corn
2014	Soybeans
2013	Corn

Onsite vegetation types in non-cultivated areas within the Site primarily occur adjacent to the county-managed drains. Barr noted the following dominant vegetation types in these non-cultivated areas adjacent to ditches during a first visit completed in July 2023, the list is not necessarily exhaustive:

- Big bluestem (*Andropogon gerardii*)
- Stiff goldenrod (*Solidago rigida*)
- Side oats grama (*Bouteloua curtipendula*)
- Western wheatgrass (*Pascopyrum smithii*),
- Whorled milkweed (*Asclepias verticillate*)
- Smooth brome (*Bromus inermis*)
- Canada wild rye (*Elymus canadensis*)

Minimal tree coverage was noted but some trees were present along parcel boundaries or adjacent to the road. Box elder (*Acer negundo*), Siberian elm (*Ulmus pumila*), and common buckthorn (*Rhamnus cathartica*) were the dominant tree species observed in the Site.

4.5.6.1 Impacts and Mitigative Measures

Land within the Site will convert from an agricultural use to solar energy use for the life of the Project. Birch Coulee Solar designed the Project to avoid tree clearing. Birch Coulee Solar will also largely avoid the areas of non-agricultural vegetation based on their proximity to county drainage ditches with buffer areas (Section 4.5.5).

Birch Coulee Solar will seed the non-impervious portions of the Project with a low-growing vegetation seed mix in accordance with the VMP (Appendix F). The seed mixes will promote pollinator habitat, establish stable ground cover, reduce erosion and runoff, and improve infiltration. Control of invasive and noxious weeds will be ongoing during the construction and operation of the Project. Birch Coulee Solar will require rumble strips at construction entrances and a designated equipment cleaning area to remove noxious weeds and seeds prior to transporting to the Project based on DNR recommendations.

4.5.7 Wildlife

The rural agricultural landscape within and surrounding the Site likely serves as habitat for common resident and migratory wildlife species, such as:

- Deer
- Fox
- Coyote
- Turkey
- Pheasants
- Raccoon
- Rabbits
- Skunk
- Rodents
- Reptiles
- Amphibians
- Waterfowl
- Birds

Some of the bird species that may pass through the Site and its vicinity include:

- Red-winged black birds
- Common grackle
- Meadowlark
- Bobolink
- Horned lark
- Red-tailed hawk
- American kestrel

Given the predominantly agricultural setting of the Site, wildlife inhabiting the area is likely adapted to human disturbance.

As discussed below in Section 4.5.8, there are no recorded documentations of rare species within 1 mile of the Site. No WMAs, Waterfowl Production Areas, or other areas designated/managed for wildlife and associated habitat are within 1 mile of the Site.

4.5.7.1 Impacts and Mitigative Measures

Direct impacts on wildlife residing in the Site may occur during construction activities because of vehicle movement and ground disturbing activities. Vehicles and other equipment moving within the Site could injure or kill individual animals, such as small mammals, amphibians, reptile species, and nesting birds. However, current routine agricultural activities pose a similar potential threat to wildlife residing in the Site.

Potential indirect impacts to wildlife may occur due to temporary habitat loss and displacement. During construction, indirect impacts to wildlife species could occur from increased noise and human activity which could disrupt wildlife species in the vicinity of the Site, causing them to temporarily abandon habitat. Most common wildlife species are mobile and can leave the affected area or seek refuge within the area to avoid impacts from noise. Extensive similar habitat is present in the vicinity of the Site. Birch Coulee Solar will apply the county's setbacks from road rights-of-way (67 feet), which exceeds the DNR's recommendation of 50 feet from road rights-of-way to provide space for animals to travel (reference (88)).

4.5.8 Rare and Unique Natural Resources

Per Section 7 of the Endangered Species Act (ESA) of 1973, as amended, activities conducted, sponsored, or funded by federal agencies must be reviewed for their effects on species federally listed or proposed for listing as threatened or endangered. Per the Minnesota ESA, the DNR is responsible for overseeing the regulations and permitting for development projects under Minn. Stat. § 84.0895 and associated rules governing the taking (including killing, capturing, collecting, and/or possessing) of state endangered or threatened species in Minnesota.

4.5.8.1 Federal Rare Species

The USFWS Information for Planning and Conservation (IPaC) queried on February 12, 2024, identifies the following rare species potentially occurring in the Site (Appendix J):

- Northern long-eared bat (*Myotis septentrionalis*; federally endangered and state watchlist)
- Prairie bush clover (*Lespedeza leptostachya*; federally and state threatened)
- Tricolored bat (*Perimyotis subflavus*; federally proposed endangered)
- Salamander mussel (*Simpsonaias ambigua*; federally proposed endangered)
- Monarch butterfly (*Danaus plexippus*; federal candidate)
- bald eagle (*Haliaeetus leucocephalus*)

No designated critical habitat is present within the vicinity of the Site.

Northern Long-eared Bat

The northern long-eared bat inhabits caves, mines, and forests (reference (89)). Given the agricultural landscape, the Site has minimal suitable forested habitat for northern long-eared bats. Trees present could provide suitable roosting habitat for northern long-eared bats. According to the DNR and USFWS, there are no known hibernacula or roost trees in Renville County or Redwood County (approximately 1 mile south of the Site) (reference (90)).

Prairie Bush Clover

The prairie bush clover inhabits outcrop prairie and mesic to dry prairies (reference (91)). The Site is predominantly agricultural, with few areas of natural vegetation. As noted in Section 4.5.6, non-agricultural vegetation is present in the Site. While these areas contain some plant species found in prairies, they are not native prairie habitat suitable for prairie bush clover.

Tricolored Bat

On September 14, 2022, the USFWS proposed listing the tri-colored bat as an endangered species under the ESA. A decision on the final rule listing the species as endangered is expected to occur prior to construction of the Project.

During the spring, summer, and fall, the tricolored bat is typically associated with forested habitats and occasionally in manmade structures such as barns, above porches, and bridges (reference (92)). Like

northern long-eared bat, trees present could provide suitable roosting habitat. The Project is not likely to impact any manmade structures within the Site that may support the tricolored bat.

Salamander Mussel

On August 22, 2023, the USFWS proposed listing the salamander mussel as an endangered species under the ESA. The salamander mussel inhabits swift-flowing rivers and streams with areas of shelter under rocks or in crevices (reference (93)). According to the DNR, the salamander mussel is currently restricted to the lower St. Croix River, where it is rare; it has been documented by the DNR in Chippewa and Nicollet County (west and east of Renville County) but not in Renville County (reference (94)).

Monarch Butterfly

In December 2020, the USFWS assigned the monarch butterfly a candidate for listing under the ESA due to its decline from habitat loss and fragmentation. Candidate species are not protected under the ESA. The USFWS added the monarch to the updated national listing workplan and based on its listing priorities and workload, intends to propose listing the monarch in Fiscal Year 2025, if listing is still warranted at that time, with a possible effective date within 12 months of the proposed rule (reference (95)).

Monarch butterflies rely exclusively on the presence of milkweed (*Asclepias* spp.) to complete the caterpillar life stage (reference (96)). Milkweed was documented during the July 2023 site visit and water resources delineation within one of the areas noted on Map 3 as containing native vegetation and its associated wetland in the south-central part of the Site. This area could provide suitable reproduction habitat for monarch butterflies. The non-agricultural parts of the Site could provide suitable foraging habitat for monarch butterflies.

Bald Eagle

Bald eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). The BGEPA protects and conserves bald eagles and golden eagles (*Aquila chrysaetos*) from intentional take of an individual bird, chick, egg, or nest, including alternate and inactive nests. Unlike the MBTA, BGEPA prohibits disturbance that may lead to biologically significant impacts, such as interference with feeding, sheltering, roosting, and breeding or abandonment of a nest. Bald eagles typically nest in mature trees near large lakes or streams. Nesting habitat suitable for bald eagles is not present within the Site and the closest suitable nesting habitat is associated with the Minnesota River, approximately 1 mile south and southwest of the Site.

Impacts and Mitigative Measures

Due to lack of suitable habitat, the Project will not affect the prairie bush clover, salamander mussel and bald eagle; as such, Birch Coulee Solar does not propose mitigative measures for these species.

The IPaC confirmed unauthorized take of the northern long-eared bat is unlikely (Appendix J). However, it is possible that northern long-eared bats and tricolored bats could use the few areas of tree cover in the Site as roosting habitat. Birch Coulee Solar does not anticipate the need to clear trees for the Project. However, any necessary tree clearing will occur in the winter months (November 1 to March 31), when bats are hibernating.

Limited suitable habitat for monarch butterflies is present in the Site adjacent to the county ditches; however, Birch Coulee Solar does not impact these areas of suitable habitat during construction or

operation of the Project. As discussed in Section 4.5.6, once construction is complete, Birch Coulee Solar will seed the non-impervious areas with native vegetation.

Birch Coulee Solar will comply with the BGEPA and MBTA. Recommendations to comply with BGEPA and MBTA typically include clearing forested habitat outside the nesting season and conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

4.5.8.2 State Rare Species

According to the Natural Heritage Information System (NHIS) database (Barr License Agreement 2022-008), there are no known occurrences of state-listed or special concern species within one mile of the Site. Furthermore, there were no observations of state-listed or special concern species during the 2023 habitat assessment.

Impacts and Mitigative Measures

Birch Coulee Solar submitted a Natural Heritage Review (NHR) request through the DNR Minnesota Conservation Explorer (Project ID 2023-00694) for the Project. The DNR NHR response received in September 2023 indicates that the Project will not affect any known occurrences of rare features (Appendix J). The NHR response also acknowledges suitable roosting habitat for northern long-eared bats and suggests avoiding any tree clearing between June 1 and August 15. Birch Coulee Solar does not anticipate clearing trees for the Project; however, if tree clearing is determined to be necessary closer to construction, it will occur outside of the June 1 to August 15 period. Because the Project is not expected to impact any rare species in the area, Birch Coulee Solar does not propose mitigative measures for state rare species.

4.5.8.3 DNR High Value Natural Resources

Rare Species and Native Plant Communities

The DNR Minnesota Biological Survey (MBS) maps and classifies native plant communities (NPCs) throughout the state using plant species, soils, and other site-specific data from vegetation plots. The current NPC classification covers most of the wetland and terrestrial vegetation in the state and consists of a six-level hierarchical classification that accounts for (reference (97)):

- Vegetation structure and geology
- Ecological processes
- Climate and paleohistory
- Local environmental conditions
- Canopy dominants
- Substrate
- Environmental conditions

There are no NPCs in the Site; the closest NPC (a pin oak – bur oak woodland; FDs37b) is approximately 0.5 mile southwest of the Site (Map 21).

Native Prairie

Native prairie is “grassland that has never been plowed and contains plant species representative of prairie habitats” (reference (88)). Since the mid-nineteenth century, 99 percent of Minnesota’s 18 million acres of native prairie grassland has been destroyed. The DNR and MBS keep track of native prairie communities throughout the state as well as native prairie remnants along railroad rights-of-ways. There is no native prairie present in the Site. As shown on Map 21, the closest native prairie is approximately 0.25 miles south of the Site.

Wildlife Action Network and Minnesota Wildlife Action Plan

The Wildlife Action Network is comprised of areas with high concentrations or persistent or viable populations of Species of Greatest Conservation Need (SGCN), Sites of Biodiversity Significance (SBS), Lakes of Biological Significance, and streams with exceptional indices of biological integrity. Minnesota’s State Wildlife Action Plan (2015-2025) proactively addresses the state’s conservation needs and catalyzes actions to prevent species listing under the state endangered species program or the ESA. SGCN are native animals with rare, declining, or vulnerable populations and species for which the state has a stewardship responsibility (reference (98)).

Based on the DNR’s NHIS database, there are no SGCN within the Site. The Site does not intersect any habitats within the Wildlife Action Network including Sites of Biodiversity Significance (SBS), Lakes of Biological Significance, or streams with exceptional indices of biological integrity. However, as shown on Map 21, there are several SBS within 1 mile of the Site with an MBS ranking of “moderate,” with a few SBS ranked “below.” SBS ranked “moderate” 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. SBS ranked “below” 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
- Open space

Lakes, Wetlands, Streams, Rivers, and Floodplains

Section 4.5.5 discusses lakes, wetlands, streams, rivers, and floodplains.

Large Block Habitats

Large blocks of grassland or forest habitat can provide “an increased diversity of species, higher species populations, and more resilient and complex ecological communities” (reference (88)). Constructing solar projects within large block habitats causes habitat loss and fragmentation, which is detrimental to species who require large areas for nesting, food, population success, etc. Most of the Site is agricultural; as such, no large block habitats are present and habitat loss or fragmentation is not anticipated.

Public Conservation and Recreation Lands

Section 4.2.10 discusses public conservation and recreation lands.

Conservation Easements

Section 4.2.11 discusses conservation easements.

Impacts and Mitigative Measures

Except for wetlands (Section 4.5.5), no additional DNR high value natural resources are present in the Site. As such, impacts to DNR high value natural resources will not occur and Birch Coulee Solar does not propose mitigative measures.

4.6 Climate Change

4.6.1 Existing Environment and Potential Future Conditions

The DNR Minnesota Climate Trends tool provides a summary of historical climate data for various regions across Minnesota (reference (99)). The historical climate data in this tool was collected from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (reference (100)) and the Parameter-elevation Regression on Independent Slopes Model Climate Group (reference (101)). Historical climate was summarized for Renville County, Minnesota.

Table 4-18 summarizes data from the DNR Minnesota Climate Trends tool for Renville County.

Table 4-18 DNR Minnesota Climate Trends Tool, Renville County Data Summary

Parameter	Tool Output Summary
annual average temperature	shows increase of 0.18 degrees Fahrenheit (°F) per decade from 1895 to 2023 and 0.42°F increase per decade from 1994 to 2023
maximum temperature data	shows a historical increasing trend at a rate of 0.03°F per decade from 1895 to 2023 and an increasing trend of 0.45°F per decade from 1994 to 2023
minimum temperature	shows increasing 0.03°F per decade from 1895 to 2023 and 0.40°F per decade from 1994 to 2023
Total annual precipitation trends	shows an increasing rate of 0.29 inches per decade from 1895 to 2023 and 0.32 inches per decade from 1994 to 2023

The DNR's Minnesota Climate Explorer tool provides a summary of projected climate conditions for the state of Minnesota (reference (99)). These projections are based on eight Coupled Model Intercomparison Project Phase 5 global climate models that are downscaled using dynamical processes in a regional weather model to a higher spatial and temporal resolution. The University of Minnesota performed the downscaling. The projected climate data is summarized in 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 greenhouse gas (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 greenhouse gas (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 (reference (102)). Table 4-19 summarizes the climate models data for Renville County.

Table 4-19 DNR's Minnesota Climate Explorer Tool, Renville County Data Summary

Parameter	Tool Output Summary
Average temperature	The climate models predict an increase by approximately 3°F by Mid-Century (2040 to 2059) compared to Current (1980 to 1999) conditions under the RCP 4.5 scenario. For Late-Century (2080 to 2099), the climate models predict air temperature to increase by approximately 6°F under RCP 4.5 and approximately 10°F under the RCP 8.5 scenario.
Maximum temperature	The models predict an increase by approximately 4°F by Mid-Century (2040 to 2059) compared to Current (1980 to 1999) conditions under the RCP 4.5 scenario. For Late-Century (2080 to 2099), the models predict an increase of approximately 6°F under RCP 4.5 and approximately 10°F under the RCP 8.5.
Minimum temperature	The models predict an increase by approximately 3°F by Mid-Century (2040 to 2059) compared to Current (1980 to 1999) conditions under the RCP 4.5 scenario. For the Late-Century (2080-2099), the models predict an increase of approximately 6°F under RCP 4.5 and approximately 11°F under the RCP 8.5 scenario.
Mean of total annual precipitation	The model mean of total annual precipitation shows that from the Present to Mid-Century under RCP 4.5 conditions, there may be an increase in average precipitation of approximately 0.21 inches. For Late-Century, the model mean shows an increase of approximately 0.85 inches (RCP 4.5) and 3.25 inches (RCP 8.5).

The USEPA 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 area (reference (103)). The USEPA Streamflow Projections Map anticipates a change in average streamflow of the Minnesota River (NHD reach code: 07020007000100) by a ratio of 1.14 (90th percentile) under wetter projections and a ratio of 1.20 (10th percentile) under drier projections in 2071 to 2100 (RCP 8.5) compared to baseline historical flow (1976 to 2005) (reference (104)). This means that wetter conditions are projected to increase at the end of the 21st century compared to the present and drier conditions will likely have little change. The Minnesota River is approximately 1 mile south of the Project at the closest point.

4.6.2 Potential Impacts of Climate Change on the Project

Because there is an anticipated increase in 100-year storm intensity for the area comprising the vicinity of the Project, there is potential for waterways to be subject to greater amounts of erosion. Birch Coulee Solar will develop and implement a SWPPP during construction that considers storm events to design permanent stormwater features. During operation of the Project, vegetative cover will minimize potential for erosion impacts to waterways.

Periods of drought may also be possible; therefore, Birch Coulee Solar selected seed mixes for permanent vegetation accordingly. Increased variability in temperature associated with climate change is not likely to affect construction or long-term operations of the Project.

Birch Coulee Solar designed the Project to be resilient to future climate scenarios and the potential for more severe weather events (e.g., wind, hail, lightning). The Project was designed to withstand wind speeds up to 111 miles per hour and snow loads of 76 pounds per square foot. The impacts of climate change on the Project are likely to be minimal.

4.7 Greenhouse Gas Emissions

Anthropogenic CO_2 emissions are responsible for about two-thirds of the energy imbalance that is causing Earth's temperature to rise, which has direct and cascading effects on weather, vegetation, agriculture, disease, availability of water, and ecosystems (reference (105)). There is general agreement that immediate and large-scale progress toward carbon neutrality is necessary. The first binding global agreement, the Paris Agreement established in 2016, aims keep the rise in mean global temperature to well below 3.6°F, and preferably limit the increase to 2.7°F (reference (106)).

More recently in 2021, the United States announced the Net Zero World Initiative to reach net zero by 2050 and the 2030 Greenhouse Gas Pollution Reduction target to achieve a 50-52 percent reduction in greenhouse gas (GHG) emissions from 2005 levels (references (107); (108)).

The state of Minnesota has a goal for the reduction of greenhouse gas (GHG) emissions, set forth in Minn. Stat. § 216H.02, subd. 1:

> *It is the goal of the state to reduce statewide greenhouse gas emissions across all sectors producing those emissions to a level at least 15 percent below 2005 levels by 2015, to a level at least 30 percent below 2005 levels by 2025, to a level at least 50 percent below 2005 levels by 2030, and to net zero by 2050. The levels will be reviewed annually by the commissioner of the MPCA, taking into account the latest scientific research on the impacts of climate change and strategies to reduce greenhouse gas emissions published by the Intergovernmental Panel on Climate Change.*

Minn. Stat. § 216B.1691 Renewable Energy Objectives requires all electric utilities to generate or procure an amount equal to 100% of electricity sold to Minnesota customers from carbon-free sources by 2040, with an interim goal of 80% carbon-free electricity by 2030. Carbon-free sources are those that generate electricity without emitting CO_2. Electric utilities must generate or procure 55% of electricity sold to Minnesota customers from an eligible energy technology by 2035. Eligible energy technology includes technology that generates electricity from solar, wind, and certain hydroelectric, hydrogen, and biomass sources.

4.7.1 Project Greenhouse Gas Emissions

The Project involves the construction and operation of a solar facility. The nameplate capacity for the Project is up to 125 MWac, which is equivalent to approximately 264,000 MWh of energy generation. The average amount of GHG emissions associated with the generation of this amount of energy is approximately 99,463 metric tons of carbon dioxide equivalent (CO_2e). According to the U.S. Environmental Protection Agency's (USEPA's) Greenhouse Gas Equivalencies Calculator, the Project will offset approximately 112,202 metric tons of carbon dioxide (CO_2). This is the equivalent of the following:

- 24,968 passenger vehicles driven for one year
- 125,682,954 pounds of coal burned
- 14,141 home's energy consumption for one year

The Project will assist in achieving the GHG emissions reduction and carbon-free electricity goals outlined by the state of Minnesota, as well as other national and international goals.

The total GHG emissions produced by the construction and operation of the Project will be minimal when compared to the reduction in long term emissions. GHG emissions associated with the construction and operation of the Project consist of direct emissions generated from combustion sources (e.g., mobile on- and off-road sources) and land use change. Indirect emissions associated with the construction and operation of the Project include the GHG emissions associated with electrical consumption.

GHG emission sources from construction activities will include, but are not limited to, fuel combustion equipment, off road combustion such as backhoes and skid steers, mobile source combustion and land use change. Impacts are anticipated to be minimal when compared to the overall carbon offset of the Project.

The Project will alter cultivated cropland, resulting in an impact to existing natural carbon sinks in the area. The land disturbance will occur during construction and include a loss of up to 1,343 metric tons of CO_2e that will otherwise be captured by the natural sinks. However, Birch Coulee Solar will reseed non-impervious surfaces that provide a natural CO_2e sink. At the conclusion of the Project operation, the Site is expected to revert to agricultural use.

Table 4-20 summarizes the estimated Project operational GHG emissions. Appendix K provides the detailed calculations. Direct operational GHG emission sources include estimations of fuel combustion from mobile sources and generators (for emergency purposes at the O&M facility and for backup use at the substation). Indirect operational emissions are the estimated 43,269 kWh/year of electrical consumption. The total estimated Project operation emissions are 1,370 metric tons CO_2e annually.

Table 4-20 Summary of Operations GHG Emissions

Emission Source	Source Type	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO_2e (metric tons/year)
Fuel Combustion	Direct	7.6	3.3E-04	6.72-05	7.7
Land Use Change	Direct	--	--	--	1,342.8
Electrical Consumption	Indirect	19.5	2.1E-03	2.9E-04	19.7
TOTAL	**ALL SOURCES**	27.2	2.4E-03	3.6E-04	1,370.1

4.8 Potential Cumulative Impacts

Minn. R. 4410.0200, subp. 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.

In other words, cumulative impacts are combined, incremental effects of human activity. While an individual activity may be insignificant by itself, minor impacts in combination with other actions (associated with past, present, or reasonably foreseeable future projects within the area) may cause a larger issue in a region or to an important resource. Environmental effects from past actions are inherently included in the existing conditions for each resource discussed above.

Birch Coulee Solar inquired with city, township, and county representatives regarding their knowledge of planned projects within or near the Site. No foreseeable future projects were identified as a part of these communications.

In addition, Birch Coulee Solar reviewed the Renville County website, the DOT website, and the Environmental Quality Board Environmental Review Projects Interactive Map to identify projects that are geographically and temporally like the Project and therefore could potentially interact with the environmental effects of the Project. One project was identified using publicly available resources.

Xcel Energy is applying for a Route Permit for 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. Xcel Energy proposed two routes: the Purple Route and the Blue Route. The Blue Route will be adjacent to the Site. Where it is adjacent, the route runs north to south, starting at the northernmost end of the Site, paralleling the western border of the Project. It will run south, to eventually turn west, and run parallel to 660th Ave. The proposed construction start date is in the third quarter of 2025 (reference (109)). Birch Coulee Solar does not anticipate starting construction for the Project until 2027 or later. Therefore, cumulative impacts due to construction related impacts are not anticipated. While not anticipated, if the construction schedules do overlap, cumulative impacts such as increased traffic and increased potential for soil erosion and sedimentation could occur. If both projects proceed, long-term cumulative impacts to the viewshed will occur with increased energy infrastructure in the immediate proximity.

4.9 Unavoidable Impacts

Birch Coulee Solar designed the Project to avoid impacts to environmental resources to the extent feasible and minimize by implementation of mitigative measures. Most of these unavoidable impacts will occur during construction of the Project and will resolve with the completion of construction.

Unavoidable impacts related to the Project that will last only as long as the construction period include:

- Noise associated with vehicles and equipment during construction
- Increased traffic on roads that bisect the Site
- Minor air quality impacts due to fugitive dust
- Exposed soils from grading activities and potential for soil erosion and sedimentation
- Disturbance to and displacement of some species of wildlife
- Minor GHG emissions from construction equipment and workers commuting

The primary unavoidable impacts during the life of the Project include:

- Changes to existing landscape, from agricultural land to a solar facility
- Changes in land use and vegetation from agricultural land of predominately corn and soybeans to a solar facility
- Infrequent vehicle trips from maintenance activities

5 Agency and Stakeholder Coordination

Birch Coulee Solar commits to responsible land use and incorporating sustainable best practices into the entire project lifecycle. AES understands their success is only as strong as their partnerships with the communities where their projects operate (reference (110)).

The Birch Coulee Solar team engaged agencies and stakeholders via multiple means of communication such as:

- Sending a Project introductory letter to federal, state, and local agencies, the 11 federally recognized tribes in Minnesota, and tribes expressing interest in the Site in October 2023 (Appendix H) to inform appropriate parties of the Project and seek feedback.
- Via phone calls and virtual meetings, coordinating with the Lower Sioux and Upper Sioux THPOs to have Traditional Cultural Specialists (TCS) participate in the archaeological survey in November 2023. The Lower Sioux and Upper Sioux THPOs also reviewed and provided feedback on the archaeological survey report.
- Hosting community open houses that were available to the public in October 2023 and April 2024. Stakeholders who lived within 0.25 miles of the Project were invited, ads were run in the local newspaper, and flyers were placed in the Franklin Township Office.

Refer to Table 5-1 for additional communications with agencies and stakeholders:

Table 5-1 Agency and Stakeholder Coordination Summary

Agency/Stakeholder	Date	Summary or Concern Raised	Mitigative Measures
Lower Sioux THPO, Upper Sioux THPO, Flandreau Santee Sioux THPO, Sisseton Wahpeton Oyate THPO	August 2023; September 7, 2023; October 18, 2023	Initial outreach via calls and introductory emails to four closest tribal communities regarding project boundary, proposed cultural survey scope, and Tribal Community open house on October 24, 2023.	N/A
Renville County Environmental Services	September 26 2023	Met with Environmental Services Director to provide an update on the Project, discuss wetland delineation and drain tile resources.	N/A
City of Franklin, Mayor, and Council Members	October 18, 2023	Emailed the mayor and all Franklin City Council Members with details on the upcoming community open house.	N/A
Lower Sioux Indian Community President	October 22, 2023; February 5, 2024	Met to discuss the Project scope and updates.	N/A

Agency/Stakeholder	Date	Summary or Concern Raised	Mitigative Measures
City of Franklin Council Member, Renville County Commissioners, participating landowners, adjacent landowners, community members	October 23, 2023	Held first community open house to share Project boundary and scope. Questions regarding: • Aesthetics • Recycling and Decommissioning • Future city expansion • Tax revenue • O&M local presence • Risks to soil and groundwater • Wellhead protection area and drinking water • Local vs. state permitting process	Section 4.2.6 (Aesthetics) Section 4.2.7 (Socioeconomics) Section 4.2.13 (Zoning and Land Use) Section 4.5.3 (Groundwater) Section 3.6 (Operation and Maintenance (O&M)) Appendix G (Decommissioning)
Upper Sioux THPO	October 30, 2023; November 2 and 16, 2023; February 2, 2024; March 5 and 8, 2024	Calls to plan for TCS participation in archaeological survey. Provided the draft cultural survey report for comment and feedback. Received feedback on cultural survey report.	Section 4.4; Appendix I (Phase I Cultural Resource Investigation)
Lower Sioux THPO	November 2 and 16, 2023; February 2 and 5, 2024; March 4 and 27, 2024	Calls to plan for TCS participation in archaeological survey. Provided the draft cultural survey report for comment and feedback. Meeting to discuss draft cultural survey report and proposed avoidance areas. Received feedback on cultural survey report.	Section 4.4; Appendix I (Phase I Cultural Resource Investigation)
Camp Township Board, Renville County Commissioner	Call on December 4, 2023; Meeting on February 5, 2024	Discussed property value concerns, battery storage (not part of Project), and snowdrift concerns.	Section 4.2.13 (Zoning and Land Use) Provided studies and factsheets regarding property value impacts from other utility-scale solar projects, included in Appendix H (Agency Correspondence)
Renville County Drainage Supervisor	December 12, 2023; January 3 and 8, 2024; March 7 and 10, 2024 April 1, 2024	Calls and emails to provide Site boundary and discuss plans for and status of existing county drain tile and County Ditch 109A crossing within Site.	Section 4.2.13 (Zoning and Land Use) Section 4.5.5 (Surface Waters and Floodplain) Appendix D (AIMP)

Agency/Stakeholder	Date	Summary or Concern Raised	Mitigative Measures
Adjacent Landowners	October 22 and 26, 2023; November 1 and 8, 2023; February 6, 2024; March 4 and 21, 2024; April 1 and 2, 2024	Met with three adjacent landowners to discuss status of the project and plan for permit design set. Discussed: • Glare • Wildlife and fencing • Property value • Wetlands and setbacks • Aesthetics, vegetation management • Plans for driveway for Residence 1 • Snowdrifts along road adversely affecting the snowmobile trail; per Section 4.2.10, adverse impacts are not anticipated.	Section 3.4.8 (Fencing) Section 4.2.3 (Displacement) Section 4.2.6 (Aesthetics) Section 4.2.10 (Recreation) Section 4.2.13 (Zoning and Land Use) Section 4.5.5 (Surface Waters and Floodplain) Section 4.5.7 (Wildlife) Appendix F (VMP)
Renville County Commissioners, Renville County Environmental Services, participating landowners, adjacent landowners, community members	April 2, 2024	Held second community open house to share Project design, visual renderings, and tax information, and solicit feedback on design and community partnerships. Questions regarding: • Noise • EMF • Weather and storms • Tax revenue • O&M local presence • Wildlife • Project schedule • Project components	Section 4.2.4 (Noise) Section 4.2.2 (EMF) Section 4.2.7 (Socioeconomics) Section 3.6 (Operation and Maintenance (O&M)) Section 4.5.7 (Wildlife) Section 1.3 (Project Schedule) Section 3.4 (Engineering and Operational Design)
City of Franklin Council	April 8, 2024	Shared Project design, visual renderings, and tax information with city council members. Discussed vegetation management, local zoning, and social impact partnerships.	Section 4.2.13 (Zoning and Land Use)
DOC-EERA, MDA, BWSR, DNR	April 3, 4 and 5, 2024 April 23, 2024	Held pre-application meeting with DOC-EERA and PUC staff. Provided AIMP to MDA and VMP to working group for early review and input. Received feedback from MDA on AIMP and working group on VMP.	Appendix D (AIMP) Appendix F (VMP)

Appendix H includes responses received to the Project introductory letter:

- The Camp Township Board requested a meeting to discuss the Project scope. Representatives of Birch Coulee Solar attended one township meeting virtually and a second meeting in person in February 2024 to discuss the Project.
- The DNR reviewed the Project boundary and results of the NHR and did not have significant concerns. The DNR provided guidance on seed mixes and commercial solar design recommendations.
- The USACE sent acknowledgement of the Project.

- The Minnesota Indian Affairs Council (MIAC) recommended further research and cultural resource management fieldwork with monitoring and tribal consultation to regional THPOs. Birch Coulee Solar sent a response to MIAC on December 7, 2023, summarizing coordination with THPOs for the survey. MIAC requested a copy of the cultural survey report. Birch Coulee Solar provided a copy of the report to MIAC on March 15, 2024.

- Birch Coulee Solar requested concurrence from the SHPO on the proposed survey methodology, and the SHPO provided approval of the methodology on October 20, 2023. Birch Coulee Solar provided the Phase I Archaeological Investigation report to the SHPO and requested concurrence on March 15, 2024. The SHPO provided concurrence on May 3, 2024 (Appendix H).

- The USFWS provided online reference tools and site selection and layout recommendations, as well as construction and operational recommendations.

Traditional Cultural Specialists (TCS) from the Lower Sioux and Upper Sioux tribal communities participated in the November 2023 archaeological survey and concurrently completed a Traditional Cultural Resources Survey of the area to identify sites for avoidance or monitoring during construction. As a result of TCS comments, three avoidance areas were incorporated into the Project design. Continued tribal coordination will occur as the Project progresses (Section 4.4).

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