Castle Rock Solar Project

Application to the Minnesota Public Utilities Commission for a Site Permit for an up to 150 MW_{ac} Large Electric Generating Facility

Alternative Permitting Process
MPUC Docket Number
IP7137/GS-24-267

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Castle Rock Solar Project

Dakota County, Minnesota

MPUC Docket Number: IP-7137/GS-24-267

Prepared for:

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Project Location:	Dakota County, MN
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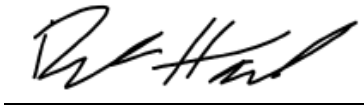
Signature:	
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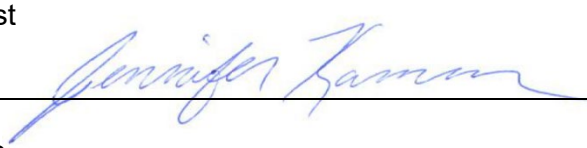
Signature:	
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AADT	Annual Average Daily Traffic
AC	Alternating Current
AIMP	Agricultural Impact Mitigation Plan
AM	Amplitude modulation
AMA	Aquatic Management Area
amsl	above mean sea level
Applicant	Castle Rock Solar, LLC
Application	Site Permit Application
AQI	Air Quality Index
ARMER	Allied Radio Matrix for Emergency Response
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
BWSR	Minnesota Board of Water and Soil Resources
Castle Rock Solar	Castle Rock Solar, LLC
CDC	U.S. Center for Disease Control
CFR	Code of Federal Regulations
CN	Certificate of Need
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
Commission	Minnesota Public Utilities Commission
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
dBA	A-weighted decibels
DC	Direct Current
DNH	Determination of No Hazard
DWSMA	Drinking Water Supply Management Area
ECS	Ecological Classification System
EERA	Energy Environmental Review and Analysis
EJ	Environmental Justice
EMF	Electromagnetic Field
FAA	Federal Aviation Administration
FCC	Federal Communications Commission

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FM	Frequency Modulation
FRPP	Farm and Ranch Lands Protection Program
FSA	Farm Service Agency
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
GSU	Generator Step-Up
HDD	Horizontal Directional Drilling
IBA	Important Bird Area
IBI	Index of Biotic Integrity
IPaC	Information for Planning and Consultation
IRA	Inflation Reduction Act
ITC	Investment tax credit
kV	kilovolt
kv/m	kilovolt per meter
LEFs	Large energy facilites
LEPGP	Large electric power generating plant
L_{eq}	Equivalent continuous sound level
L10	Sound level exceeded for 10 percent of the time
L_{50}	Sound level exceeded for 50 percent of the time
LGU	Local government unit
Matrix Renewables	Matrix Renewables MISO LLC
MBS	Minnesota Biological Survey
MBTA	Migratory Bird Treaty Act
MCE	Minnesota Conservation Explorer
MDOC	Minnesota Department of Commerce
MDH	Minnesota Department of Health
MISO	Midcontinent Independent System Operator
MN Deed	Minnesota Department of Employment and Economic Development
MNDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MnSHIP	Minnesota Statewide Historic Inventory Portal
MPCA	Minnesota Pollution Control Agency

MPUC	Minnesota Public Utilities Commission
MST	Module Surface Temperature
MW	Megawatt
MW_{ac}	Megawatts in Alternating Current
MWh	Megawatt hours
NAAQS	National Ambient Air Quality Standards
NAC	Noise Area Classifications
NGEA	Next Generation Energy Act
NHIS	Natural Heritage Information System
NLCD	National Land Cover Database
NO_2	Nitrogen Dioxide
NOD	Notice of Decision
NPC	Native plant community
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O^3	Ozone
O&M	Operations and Maintenance
ORVW	Outstanding resource value waters
OSA	Office of State Archaeologist
OSHA	Occupational Safety and Health Association
PDSI	Palmer Drought Severity Index
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM	Particulate matter
POI	Point of Interconnect
Project	Castle Rock Solar Project
PTC	Production Tax Credit
PV	Photovoltaic
PWI	Public Waters Inventory
RCNM	Roadway Construction Noise Model
RIM	Reinvest in Minnesota
ROW	Right-of-way
RPBB	Rusty patched bumble bee

SBS	Sites of Biodiversity Significance
SCADA	Supervisory Control and Data Acquisition
SGCN	Species of Greatest Conservation Need
SHPO	Minnesota State Historic Preservation Office
SNA	Scientific and Natural Area
SO^2	Sulfur dioxide
SolarStone	SolarStone Development, LLC
SPCC	Spill Containment and Countermeasure Plan
SSURGO	Soil Survey Geographic Database
SWCD	Soile & Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
TEP	Technical Evaluation Panel
TV	television
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMP	Vegetation Management Plan
WCA	Wetland Conservation Act
WHPA	Wellhead Protection Area
WMA	Wildlife Management Areas

1.0 INTRODUCTION

Castle Rock Solar LLC (Castle Rock Solar or Applicant) proposes to construct and operate the proposed Castle Rock Solar Facility, an up to 150 megawatt alternating current (MW_{ac}) photovoltaic (PV) solar energy generating system and associated facilities (the Project) to be constructed in Castle Rock Township, Dakota County, Minnesota (the Project Area; Appendix B, Map 1). The Project Area encompasses 1,355 acres, with approximately 934 acres developed to support the Project. The exact acreage to be developed for the Project will be dependent upon the final configuration of the Project substation and final design of the overall Project. Approximately 420 acres of the Project Area would continue to be utilized by the underlying landowner in their discretion. A total of approximately 1,307 acres of the Project Area is included in the Site Control Area and are under site control through private easements or lease options with Castle Rock Solar (the Site Control Area). Up to 60 acres are currently in easement negotiations for the routing of approximately 1,000 feet (up to two acres) of collection lines to connect two PV array areas in the southwest corner of the Project Area and may also potentially host solar arrays depending on final landowner lease agreements as further described in Section 2.2.2 (Appendix B, Map 2). The Site Control Area and Development Area would increase in size if the electrical easements or lease agreement currently under negotiation are agreed upon and executed by Castle Rock Solar and the underlying landowner. Upon successful negotiation of the 60-acre easement area, it will be added to the Site Control Area and the area occupied by Project facilities will be added to the acreage to be developed for the Project.

The final location of the Project substation has not been finalized. At this time, two locations on the north side of 230th Street West are being evaluated to host the Project substation. Therefore, two facility design options are presented in this application pending final location of the Project substation and are referred to as the Preferred Option and Alternate Option as presented in Appendix B, Map 3a and 3b. The Preferred Option for the Project substation is included within the 934-acre 'Preferred Project Development Area' and the Alternate Option for the Project substation is included within the 934-acre 'Alternate Project Development Area'. The Preferred Project Development Area and the Alternate Project Development Area are largely the same with some minor deviations based on the configuration of the Project substation and other Project facilities in and around the Preferred or Alternate Option locations. Both the Preferred and Alternate Option layouts for the Project have proposed Points of Interconnection (POIs) via a 138 kilovolt (kV) gen-tie line that connects to Xcel Energy's existing Chub Lake to Hampton Corners 345kV transmission line that runs along 230th Street West and bisects the Project Area. The Preferred Option would utilize an approximately 200-foot-long gen-tie line while the Alternate Option would utilize an approximately 1,450-foot-long gen-tie line. Preliminary Preferred and Alternate Option layouts for the Project are provided in Appendix B, Map 3a and 3b respectively and detailed maps of the Preferred and Alternate Project layouts are provided in Appendix B, Map sets 4a and 4b respectively.

For ease of review of this Site Permit Application (Application), Table 1 below identifies the terminology used throughout this Application to describe the areas within which the Project is proposed:

Table 1: Project Terminology

Description	Acres[1]
Site Control Area	**1,307**
Project Area	1,355[2]
Preferred Project Development Area	934
Alternate Project Development Area	934

[1]Note: Totals may not sum due to rounding.
[2]The 1,355-acre Project Area includes 60 acres that Castle Rock Solar is currently in easement negotiations for the routing of approximately 1,000 feet of collection lines to connect two PV array areas in the southwestern corner of the Project Area and may also potentially host solar arrays depending on final landowner lease agreements as further described in Section 2.2.2.

Castle Rock Solar anticipates that construction will begin in the second or third quarter of 2027, and commercial operation will commence in the fourth quarter of 2028.

In accordance with Minn. Stat. § 216E.03, subd. 1, a Site Permit is required for solar energy generating systems greater than 50 MW. The Project will be up to 150 MW_{ac} in size and will therefore require a Site Permit from the Minnesota Public Utilities Commission (MPUC or Commission) prior to construction.

The 150 MW_{ac} Project will be a single axis tracking system, situated on approximately 1,355 acres of predominantly agricultural land. The Development Area refers to the portion of the Site Control Area on which the Project equipment will be located. The Preferred Project Development Area and Alternate Project Development Area each comprise a total of approximately 934 acres which includes the area within the proposed Project exterior fences, the proposed access roads, underground cables located outside the Project exterior fences, and two acres that could be utilized for the collection lines in the additional 60 acres currently in easement and lease negotiations for the routing of approximately 1,000 feet of collection lines to connect two PV array areas in the southwestern corner of the Project Area. Neither Project Development Area includes the remaining 58 acres of the 60-acre parcel currently under negotiation. If the 60-acre parcel is leased for the Project and will be utilized for solar facilities, the Project Development Area will be increased to reflect that portion of the parcel occupied by facilities. Facilities associated with the Project are described in Section 2.1. The remaining approximately 420 acres within the Project Area will not be developed for the Project and will likely remain in its current land use of primarily cultivated cropland and woodland, or it will be seeded according to the Vegetation Management Plan (VMP) in Appendix E as determined by the lease agreement with the landowner. Areas that currently are not vegetated (i.e. cultivated cropland) that will not be returned to cultivation will be seeded in accordance with the VMP.

1.1 PURPOSE AND NEED

The Project will provide up to 150 MW_{ac} of capacity and generate roughly 300,000 megawatt hours (MWh) of clean and reliable energy annually. The Project will generate enough electricity to provide power to 20,750 homes annually. The proposed Project would contribute to satisfying utilities' and consumers' demands for renewable energy and meet utility renewable requirements or sustainability goals. The Project

will also benefit the local community through investing in construction spending, operation of the Project, property and business taxes, landowner lease payments, and the creation of new clean energy jobs.

The power generated by the Project will be delivered to the Midcontinent Independent System Operator (MISO). Castle Rock Solar submitted an interconnection application into the 2021 MISO study cycle and has an active queue position that is currently working through the multi-step MISO study process. MISO is currently projecting that the 2021 study cycle to be completed by Q3 2025 unless MISO determines more time is needed to complete the process.

The Applicant is proposing to construct the Project to sell energy, capacity and renewable energy credits, either bundled or unbundled, to one or more electric utilities and/or commercial customers. Castle Rock Solar is actively marketing the Project to a number of potential off-takers and may sell the power in the form of a Power Purchase Agreement, virtual power purchase agreement, or similar contract, or the Project could be sold in its entirety and owned directly by a utility.

The Project is consistent with and capable of supporting Minnesota's mandate and goals found in the Renewable Energy Objectives, Solar Energy Standards, and other applicable energy planning requirements.[1] The Project will support the recently enacted "100 percent by 2040" law that, generally, sets a standard for electric utilities to generate or acquire 100 percent of the energy for retail sales from carbon-free resources and expands the previous Renewable Energy Standard to require public utilities to generate or procure 55 percent of their energy used to serve Minnesota customers from renewables by 2035.[2] Further, the Project is directly aligned with the law's goal that ten percent of the retail electric sales in Minnesota be generated by solar energy by 2030.[3]

Current federal energy policy promotes the expansion of renewable energy and the transmission that will be necessary to interconnect that energy to the grid. In August 2022, President Biden signed into law the Inflation Reduction Act (IRA), which allocates over $300 billion to promote investments in zero carbon power generation supply, emissions reduction technology, and electrification and energy efficiency programs.[4] The IRA puts the United States on a path to approximately 40 percent emissions reduction by 2040 by supporting, among other things, continued development of domestic renewable energy. The IRA extends the production tax credit (PTC) and investment tax credit (ITC) for renewable energy facilities through 2024, after which time the technology-neutral Clean Energy PTC and ITC begin in 2025.[5] A major goal of the IRA is to power homes, businesses, and communities with much more clean energy by 2030, including: 950 million solar panels, 120,000 wind turbines, and 2,300 grid-scale battery plants. The IRA also aims to reduce greenhouse gas emissions by about 1 gigaton in 2030, or a billion metric tons.[6] Given the demand

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[1] See Minn. Stat. §§216B.1691, Subd. 2f, Subd. 2g, 216C.05, and 216E.02, Subd. 1.
[2] *See* Minn. Stat. §§ 216B.1691, Subd. 2f, Subd. 2g.
[3] *See* Minn. Stat. § 216B.1691 Subd. 2f.
[4] Chris Seiple, US Inflation Reduction Act set to make climate history: Two ways the flagship legislation will accelerate decarbonization in the US, Wood Mackenzie (August 19, 2022) (available at https://www.woodmac.com/news/opinion/us-inflation-reduction-act-set-to-make-climate-history/). ("Seiple").
[5] H.R.5376 - Inflation Reduction Act of 2022.
[6] *By The Numbers: The Inflation Reduction Act*, Whitehouse.gov (August 15, 2022) (available at https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/15/by-the-numbers-the-inflation-reduction-act/).

for renewable energy at the state and federal level, a market exists for independently produced electricity generated from solar and other renewables, including the energy that will be generated by the Project. The clean, renewable power that will be generated by the Project can help meet utility commitments in an efficient and reliable manner, achieve greenhouse gases (GHG) reduction targets, and provide short- and long-term economic benefit.

1.2 APPLICANT INFORMATION

The Applicant for this Application is:

Castle Rock Solar LLC
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The contact persons regarding this Application are:

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1.2.1 OWNERSHIP

The applicant is Castle Rock Solar LLC, a Minnesota limited liability company and an independent power producer. Castle Rock Solar is a wholly owned subsidiary of Midcontinental Renewables LLC, which is jointly owned by SolarStone Development, LLC (SolarStone) and Matrix Renewables MISO LLC (Matrix Renewables). Castle Rock Solar will own and operate the Project. SolarStone is developing the Project.

Founded in 2012, SolarStone develops, constructs, owns, and operates highly competitive solar, and energy storage projects in North America. After developing over 100 MW in Minnesota, the SolarStone team expanded into many other community solar markets as well as utility scale solar development across the U.S. SolarStone is currently developing over 5,000 MW of both community and utility scale solar in over 14 states.

Matrix Renewables (https://matrixrenewables.com/) is a renewable energy platform that was founded by global alternative asset manager TPG (https://www.tpg.com/) through its impact investing platform, TPG Rise, in 2020. TPG Rise is a $18 billion impact investing platform focused on investing in and supporting the growth of world-class businesses that deliver positive and measurable social and environmental impact globally.

Matrix Renewables focuses on developing, constructing, and being long-term owners of renewable energy assets. Matrix Renewables' current portfolio is comprised of 14.3 gigawatts (operational, under

construction, ready to build, under development) of renewable energy projects, storage, and green hydrogen across North America, Europe, and Latin America.

As of this permit filing, Castle Rock Solar plans to own the Project following the start of commercial operations. Although not planned at this time, Castle Rock Solar and SolarStone Development reserve the right to sell or assign the Project to another qualified entity at any time before, during, or after the Project is constructed.

1.3 PROJECT SCHEDULE

Table 2 shows an estimated Project schedule of planned activities. Actual timelines for each activity may vary. The Project is expected to be operational by the fourth quarter of 2028.

Table 2: Project Schedule

Activity	Timeline
Site Permit Issued	Fourth Quarter 2025 / First Quarter 2026
Generator Interconnection Agreement (GIA) Execution	First / Second Quarter 2026
Commencement of Construction	Second / Third Quarter 2027
Testing and Commissioning	Third / Fourth Quarter 2028
Operation	Fourth Quarter 2028

1.4 POTENTIAL PERMITS/APPROVALS

Table 3 summarizes the federal, state, and local permits and approvals that may be required for construction and operation of the Project. Castle Rock Solar will obtain any required permit or approval prior to undertaking the activity requiring such permit/approval.

Table 3: Potential Permits/Approvals

Agency	Permit	Applicability	Permit Status & Timing
Federal			
U.S. Army Corps of Engineers (USACE) St. Paul District	Clean Water Act (CWA) Section 404 Permit	Dredging or filling jurisdictional Waters of the United States (wetlands/waterways). If impacts to non-tidal wetlands are greater than 0.5-acre, Regional General Conditions apply.	To be obtained prior to construction, as needed.
	Wetland and Waters Delineation Approval	Needed to determine extent of USACE jurisdiction, quantify impacts, or document avoidance.	Boundary concurrence was requested from the Wetland Conservation Act (WCA) Local Government Unit (LGU) and the USACE on August 22, 2024. The

Agency	Permit	Applicability	Permit Status & Timing
			Notice of Decision (NOD) for boundary concurrence was received from the LGU on December 26, 2024.
	Approved Jurisdictional Determination	An Approved Jurisdictional Determination is optional at the applicant's request and is not necessary for the USACE to process an application.	To be obtained prior to construction, as needed.
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act Section 10(a), Incidental Take Permit and Habitat Conservation Plan	Projects potentially taking federally listed species without a federal nexus.	To be obtained prior to construction, as needed. Not currently anticipated to be needed.
	Bald and Golden Eagle Protection Act, Eagle Take Permit	Projects involving potential take of Bald and Golden Eagles.	To be obtained prior to construction, as needed. Not currently anticipated to be needed.
U.S. Environmental Protection Agency (USEPA)	Spill Prevention, Control, and Countermeasure (SPCC) Plan	Project facilities with oil storage of more than 1,320 gallons.	To be prepared prior to construction, as needed
Federal Aviation Administration (FAA)	Notification of Proposed Construction or Alteration (Determination of No Hazard [DNH]) (Form 7460-1)	Required for construction or alteration of structures that are 200 feet or higher above ground level, structures near airports, or sited within line of sight of radar of an air defense facility.	FAA Notice Criteria Tool Completed August 30, 2024. DNH submittal and receipt is not required.
State			
Minnesota Public Utilities Commission	Site Permit	Site Permit required for Large Electric Generating Facilities greater than 50 MW.	To be obtained prior to construction.
Minnesota Pollution Control Agency (MPCA)	Section 401 Water Quality Certification	Federally permitted activities (Section 404 Individual or Nationwide Permit) that result in discharges to waters of the U.S. (including regulated wetlands) that may violate water quality standards.	To be obtained prior to construction, as needed.
	National Pollutant Discharge Elimination System (NPDES) General Permit and Stormwater Pollution Prevention Plan (SWPPP)	General NPDES Permit No. MNR100001 for stormwater discharges associated with regulated construction activity that will result in land disturbance equal to or greater than one acre.	To be obtained prior to construction.
Minnesota Department of Agriculture	Agricultural Impact Mitigation Plan (AIMP)	Consultation with the Department to determine need for mitigation.	The AIMP was reviewed by MN Dept. of Agriculture prior to filing and its suggested revisions are included in the AIMP filed with this Application.
Minnesota Department of Health (MDH)	Well construction permit	Required for installation of a well.	To be obtained prior to construction (for operations and

Agency	Permit	Applicability	Permit Status & Timing
			management building), as needed.
Minnesota Department of Labor and Industry	Electrical inspection of installed equipment	Necessary to comply with state electrical codes.	Inspection(s) to be conducted during construction and prior to operation.
Minnesota Department of Natural Resources (MNDNR)	Water Appropriation / Dewatering Permit	Required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year (dewatering).	To be obtained prior To or during construction, as needed.
	Consultation and Review of State Threatened and Endangered Species	Potential effects on State threatened and endangered species.	To be obtained prior to construction, as needed.
MNDNR, Division of Lands & Minerals	Utility Crossing License	License for the passage of any utility over, under, or across any state land or public water.	To be obtained prior to construction, as needed.
MNDNR	Public Waters Work Permit	Required for work occurring below the ordinary high-water line in public waters and public waters wetlands.	To be obtained prior to construction, as needed.
Minnesota Historical Society, State Historic Preservation Office (SHPO)	Consultation	Consultation with the SHPO.	To be conducted prior to construction.
Minnesota Department of Transportation (MnDOT)	Oversize/ Overweight Permit	Vehicles delivering equipment, materials, and supplies that exceed applicable MnDOT height/length limits and weight limits.	To be obtained prior to equipment deliveries, as needed.
County/Local			
WCA LGU - Dakota County Soil & Water Conservation District (SWCD)	MN WCA	The Minnesota WCA Rules (Chapter 8420) requires anyone proposing to drain, fill, excavate, or otherwise impact a wetland first try to avoid impacts, then minimize any unavoidable impacts and replace any lost wetland acreages, functions, and values.	To be obtained prior to construction, as needed. The NOD for concurrence of wetland boundaries was received from the LGU on December 26. 2024.
	Floodplain Permit	Construction of structures or buildings or maintenance of existing structures or buildings within a floodplain. Change of use of building, structure, or land. Any temporary placement of fill, excavation of materials or the temporary storage of materials or equipment within the floodplain.	To be obtained prior to construction only if project is in a floodplain.
	Access/Entrance Permit(s)	Required for construction of a driveway/access road utilizing county road Right-of-Way (ROW).	To be obtained prior to construction, as needed.

Agency	Permit	Applicability	Permit Status & Timing
	Oversize/ Overweight Permit	Vehicles delivering equipment, materials, and supplies that exceed applicable height/length limits and weight limits.	To be obtained prior to equipment deliveries, as needed.
	ROW	Required to work within public road ROWs.	To be obtained prior to construction, as needed.
	Utility Permit(s)	Installing utilities along, across or within the county road ROW.	To be obtained prior to construction, as needed.
	Septic System Permit	Required for installation of an individual sewage treatment system (O&M).	To be obtained prior to construction of septic system, if needed.
Castle Rock Township	Interim Use Permit	Specific requirements for solar projects are listed in the 2018-A Ordinance Amending the Castle Rock Township Zoning Ordinance Regarding Solar Electric Systems.	MPUC Site Permit supersedes and preempts an Interim Use Permit.
	Driveway/ Access Permit	Construction of new driveway/entrance on township roads.	To be obtained prior to construction, as needed.
	Utility Permit(s)	Construction and installation of new utilities along, across, or within township road ROW (electric, communications, etc.).	To be obtained prior to construction, as needed.

1.4.1 LOCAL APPROVALS

In accordance with Minn. Stat. § 216E.10, subd. 1, the site permit supersedes and preempts all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose government.

Throughout the development process, members of the Project team met with county and township representatives to provide an overview of the Project as well as to coordinate on development of the Project. A summary table of meetings where the Project was on the county or township agenda can be seen in Section 6.

1.4.2 SITE PERMIT

On August 2, 2024, Castle Rock Solar submitted a Solar Size Determination request to the Minnesota Department of Commerce (MDOC) Energy Environmental Review and Analysis (EERA) in accordance with Minn. Stat. § 216E.021, subd. A. This request is made to determine whether the Project meets the definition of a large electric power generating plant (LEPGP) and, therefore, is subject to the Commission's siting authority.

The EERA issued a size determination for the Project on August 19, 2024, which is provided in Appendix N. The EERA determined that, based on criteria established in Minn. Statute 216E.021, the Castle Rock

Solar Project is not associated with other planned solar projects in a way that would require them to be combined into a single project. However, given that the Project on its own has a generating capacity of up to 150 MWac, EERA determined that the Project is subject to the Commission's siting authority and must submit an application for a site permit under the Power Plant Siting Act (Minnesota Statute 216E).

Pursuant to Minn. Stat. § 216E.04, subd. 2(8), Castle Rock Solar is seeking approval of a Site Permit Application under the alternative review process provided for under Minn. Stat. Sec. 216E.04 and Minn. R. 7850.2800 to 7850.3900. Castle Rock Solar filed a Notice of Intent to Submit a Site Permit application under the Alternative Permitting Process to the Commission on August 2, 2024

1.4.3 CERTIFICATE OF NEED

The Project falls into an exception to the certificate of need (CN) requirement, so a CN is not required. A CN is required for all "large energy facilities" (LEFs), as defined in Minn. Stat. § 216B.2421, subd. 2(1), unless the facility falls within a statutory exemption from the CN requirements. Because the Project is a generating plant larger than 50 MW, it meets the definition of an LEF and would require a CN prior to issuance of a Site Permit and construction. However, the Project is exempt from CN requirements because it is a solar energy generating system, as defined in Minn. Stat. § 216E.01, subd. 9(a) and the Project is being developed and permitted by an independent power producer, Castle Rock Solar, under Minn. Stat. Chapter 216E.[7]

2.0 PROJECT INFORMATION

2.1 PROJECT OVERVIEW

The Project is an up to 150 MW_{ac} solar energy generating system and associated facilities located in Castle Rock Township, Dakota County, Minnesota, with the City of Farmington to the northwest, City of Hampton to the east, and the community of Castle Rock to the southwest. The Project Area encompasses 1,355 acres, with approximately 934 acres developed to support the Project with the exact acreage dependent upon the final configuration of the Project. Approximately 420 acres of the Project Area would continue to be utilized by the underlying landowners in their discretion. A total of approximately 1,307 acres of the Project Area are included in the Site Control Area and are under lease and easement agreements with Castle Rock Solar. Up to 60 acres are currently in easement and lease negotiations for the routing of approximately 1,000 feet of collection lines to connect two PV array areas in the southwestern corner of the Project Area and may also potentially host solar arrays depending on final landowner lease agreements as further described in Section 2.2.2. The Development Area is predominately agricultural land. The Site Control Area and Development Area would increase in size if the electrical easement and lease currently under negotiation are agreed upon and executed by Castle Rock Solar and the underlying landowner.

The Project will consist of the following:

- solar panels,

[7] See Minn. Stat. § 216B.243, subd. 8(a)(7) (2024).

- a tracking rack system,
- combiner boxes,
- inverters,
- step-up transformers and associated substation equipment,
- MET stations,
- fencing,
- access roads, and improvements to existing access roads or driveways as needed,
- stormwater management systems,
- temporary laydown yards, temporary offices,
- electrical collection system, and
- O&M facility.

Table 4 summarizes the facility components associated with the Project and their footprint within the Project Area. Descriptions of these facilities are provided in Section 4.0 and the locations of the facilities within the Project Area are shown on Map 3a and 3b and Map 4a and 4b in Appendix B.

Table 4: Project Components

Component	Acreage
Preferred Project Development Area Design	
Solar Arrays	272.8
Access Roads	12.8
Electrical Collection Lines	2.2
Inverters	0.2
O&M Facility	0.1
Project Substation	6.0
Project Switchyard	6.0
Laydown Yard[1]	5.9
Preferred Project Development Area Total[2]	**934.2**
Preferred Project Undeveloped Area[3]	**420.8**
Project Area Total	**1,355**
Alternate Project Design	
Solar Array	271.2
Access Roads	13.2
Electrical Collection Lines	2.0
Inverters	0.2
O&M Facility	0.1

Component	Acreage
Project Substation	6.0
Project Switchyard	6.0
Laydown Yard[1]	6.5
Alternate Project Development Area Total[2]	**933.5**
Alternate Project Design Undeveloped Area[3]	**421.5**
Project Area Total	**1,355**

[1] The Preferred Project Development Area design includes one laydown yard comprising 5.0 acres which will be developed for solar panels and one laydown yard, totaling 0.9 acre, which will be temporary and will be reclaimed to vegetative cover once construction is complete. The Alternate Project Development Area design includes one laydown yard comprising 5.6 acres which will be developed for solar panels and one laydown yard, totaling 0.9 acre, which will be temporary and will be reclaimed to vegetative cover once construction is complete.
[2] The Development Area includes the area within the Solar Project that is hosting solar equipment and will be surrounded by a fence. The Development Area includes access roads and electrical collection lines (including those extending beyond the Project boundary, which for the purpose of analyzing land cover impacts are assumed to be buried), inverters, an O&M Facility, Project substation, and temporary laydown yards for a total of 934.2 acres for the Preferred Project Development Area design and 933.5 acres for the Alternate Project Development Area design. Within the Preferred Project Development Area, 306 acres is occupied by the footprint of solar equipment with 628.2 acres being land within the fence but not having a facility footprint. Within the Alternate Project Development Area, 305.2 acres is occupied by the footprint of solar equipment with 628.3 acres being land within the fence but not having a facility footprint. The acreage of the solar array reflects the actual acreage of the solar panels themselves; the acreage of the aisles between the rows of solar panels is accounted for within the Total Project Development Area acreage.
[3] The Undeveloped Area includes all areas outside the fenced area but within the Project Area. Portions of the Undeveloped Area are not included in the Site Control Area and will remain under the control of the underlying landowner. Those portions of the Undeveloped Area included in the Site Control Area will either be vegetated in accordance with the VMP or will be returned to agricultural or existing land use, as stipulated by the landowner agreements.

2.2 PROJECT DESCRIPTION

2.2.1 LOCATION

The proposed Project is located in Sections 2-4, 9, and 10, Township 113 North, Range 19 West, Castle Rock Township, Dakota County, Minnesota. The City of Farmington city limits is approximately 500 feet to the northwest of the Project Area, the City of Hampton is approximately 2.5 miles east of the Project Area, and the unincorporated community of Castle Rock is approximately 3 miles southwest of the Project Area.

Table 5: Project Location

County	Township	Range	Section(s)
Dakota	113 North	19 West	2-4, 9, and 10

2.2.2 PROJECT SIZE AND DESCRIPTION

Approximately 1,307 acres are under lease or easement agreement with Castle Rock Solar. Castle Rock Solar possesses signed landowner agreements for the parcels currently proposed to host panels, access roads, substation, laydown yard, transformers, junction boxes and the collection system. However, up to 60 additional acres, within parcel ID 070090052013, are currently in easement or lease agreement negotiations for the routing of approximately 1,000 feet (for an up to two-acre easement area) of collection line to connect two PV array areas in the southwest corner of the Project Area. This area is identified as

"Potential Participating Parcel" in Maps 2, 4a, and 4b in Appendix B). If Castle Rock Solar is unable to execute an easement agreement to connect the southwestern most portion of the Project, then it may be excluded from the final Project design. This 60-acre potential participating parcel may also include development of solar arrays within the parcel depending on the final agreement with the landowner. Castle Rock Solar requests that this parcel be evaluated as part of the Site Permit to include the potential for collection lines and/or solar arrays to be developed on this parcel. Castle Rock Solar anticipates this parcel may become participating prior to issuance of the Site Permit and will provide an updated Map 2 and Project Area description in the event this parcel becomes participating.

Castle Rock Solar will locate an O&M building within the Site Control Area adjacent to the proposed Project substation, whether it is located in the preferred or alternate Project design. The O&M building will be a modular building 8 feet in height, 16 feet in width, and 40 feet in length.

The current PV module being considered in the conceptual design for the Project is the First Solar Series 7 540-Watt module. Closer to the time of construction, several PV module offerings from different suppliers will be evaluated and a selection will be made based on the most cost-effective option. The technologies that may be considered are thin-film technology, polycrystalline, monocrystalline and bi-facial PV modules, and the final supply of modules may contain a mix of several similar wattages. PV modules produced by a wide range of manufacturers are under consideration for the Project, including, but not limited to, Canadian Solar, Hanwha Qcells, JA Solar, Jinko, Longi, Risen, SunPower, Sunergy and Trina.

2.3 PROJECT COST

Table 6: Estimated Project Costs

Project Components	Cost ($ millions)
Project	
Engineering, Procurement, Construction Contractor, and Equipment	$252
Development Expense[1]	$10
Interconnection and Network upgrade costs	$40.0
Financing and Transaction costs	$34
Project Substation and Switchyard	$44M
Project Total	**$380**

[1]Development expenses include costs associated with land acquisition, title work, environmental field work, and general project level support up to notice to proceed.

3.0 PROJECT AREA SELECTION AND CONSTRAINTS ANALYSIS

- Identification of a choice of region – Castle Rock Solar first identified the areas of Minnesota which have adequate solar resource to host a solar project. Annual solar radiation in Minnesota is shown in Figure 1 below (National Renewable Energy Laboratory [NREL] 2017).

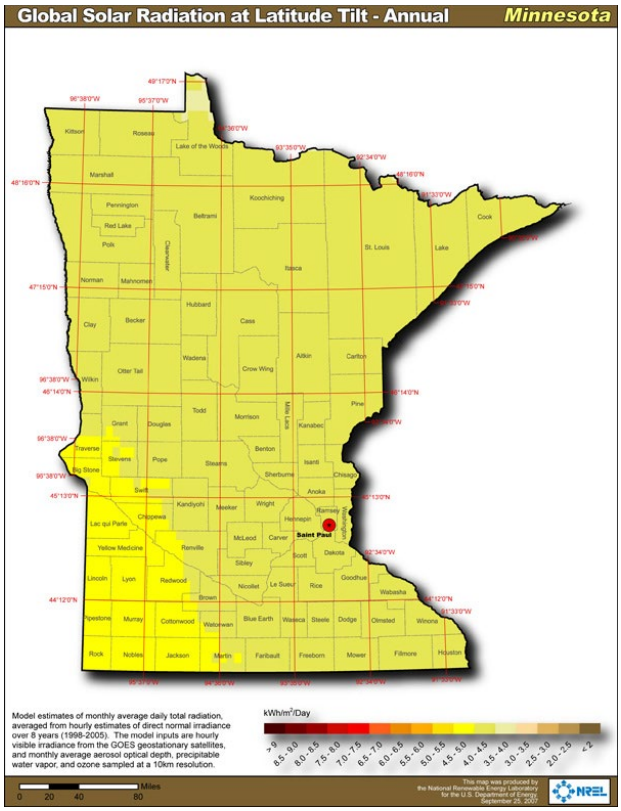

Figure 1: Annual solar radiation in Minnesota

- Identification of POI – The first step in determining a potential location for a solar project is to locate a POI with available capacity. Castle Rock Solar targeted existing transmission infrastructure located within 2 miles of first-, second-, or third-class cities to find an area that would be compliant with the Prime Farmland Rule. Castle Rock Solar identified the proposed Project location after determining the existing Xcel Energy Chub Lake to Hampton Corners 345 kV transmission line has enough capacity to interconnect to the Project and it is located within two miles of the City of Farmington.
- Voluntary landowner participation – The next step was to identify enough landowners to voluntarily agree to host the Project on their land. After obtaining final lease options, easement options, purchase options and agreements, the Project footprint was established, and a preliminary assessment of possible sites based on environmental and topographical considerations was performed.
- Setbacks – Setbacks from public ROWs, utilities, and other land uses were established and mapped.
- Unavailable or restricted land – Managed and public lands, conservancies, land under contracts such as Conservation Reserve Program (CRP), Sustainable Forest Incentive Act Forest Legacy

easements, Minnesota Native Prairie Bank, and Farmland Preservation Agreements were reviewed and considered for restrictions.

- Environmental analysis – A desktop environmental analysis and field surveys were performed to identify preliminary solar facility locations which would minimize impact to high value natural and cultural resources. High value natural resources include native plant communities (NPC), wetlands, state-listed species, federally listed species, and public lands and waters. Desktop review for high value resources included review of MNDNR Natural Heritage Inventory System (NHIS) data, USFWS Information for Planning and Consultation (IPaC), and review of the Minnesota Conservation Explorer (MCE) for resources such as Minnesota Biological Survey (MBS) Sites of Biodiversity Significance, MNDNR NPCs, Minnesota Statewide Historic Inventory Portal (MnSHIP), and the Office of the State Archaeologist (OSA) Portal online.
- Constructability and collection – Construction restrictions due to factors such as slopes, soils, and potential recognized environmental concerns such as contamination were considered. Construction efficiency and costs were also evaluated. Construction equipment movement and the ability to network the collection system between solar panel array sites were additional considerations.
- Landowner preferences – Potential locations of panels, fences, and access roads were discussed with hosting landowners and their concerns and preferences were considered in the preliminary design. Castle Rock Solar reserves the right to make minor changes in the field to accommodate unforeseen circumstances. Any such minor changes shall take into account the basic premise of setbacks, sound, and shadow considerations that were used in modeling the current Project layout.

3.1 PROHIBITED AND EXCLUSION SITES

Minnesota Rules, part 7850.4400, subpart 1 includes a list of prohibited sites where no LEPGP may be located. LEPGP are defined as capable of operating at a capacity of 50 MW or greater (Minnesota Rules, part 4400.0200, subpart 10). The prohibited sites include national parks; national historic sites and landmarks; national historic districts; national wildlife refuges; national monuments; national wild, scenic, and recreational rivers and their land use districts; state wild, scenic, and recreational rivers and their land use districts; state parks; nature conservancy preserves; state scientific and natural areas (SNA); and state and national wilderness areas. Castle Rock Solar has avoided the prohibited sites listed in Minnesota Rules, part 7850.4400, subpart 1.

Minnesota Rules, part 7850.4400, subpart 3 includes a list of sites LEPGP must be excluded from unless there is no feasible alternative. The areas include state registered historic sites; state historic districts; state wildlife management areas; county parks; metropolitan parks; designated state and federal recreational trails; designated trout streams; and the rivers identified in Minnesota Statutes, section 85.32, subdivision 1. Additional restrictions to development could also occur due to deed and funding restrictions that apply to certain parcels of MNDNR administered lands or to areas under easement. Castle Rock Solar has avoided exclusion sites to the extent practicable. Snowmobile Trail 123 currently runs through the northern portion of the site and will likely be rerouted. Further discussion regarding the Snowmobile Trail 123 can be found

in Section 5.2.9. Castle Rock Solar is working to coordinate with the club responsible for maintaining the trail, to identify alternative routes and interconnections to the snowmobile trails present in the area.

Solar projects are also prohibited in Reinvest in Minnesota (RIM), Minnesota Native Prairie Bank, and Forest Legacy easements. The easement language prohibits the development of new structures within the area under easement. No lands within the Project Area are currently enrolled in a Forest Legacy easement, RIM, or the Minnesota Native Prairie Bank (Minnesota Board of Water and Soil Resources [BWSR] 2019).

There are two Farm and Ranch Land conservation easements within one mile of the Project Area. However, no lands within the Project Area are encumbered by USFWS or private conservation easements.

Map 5 in Appendix B illustrates siting considerations Castle Rock Solar evaluated in siting the Project.

3.1.1 FACTORS DRIVING CHOICE OF REGION

The process that Castle Rock Solar followed in finding and evaluating potential project sites, such as this Project Area, is described below.

Phase I

The first phase of assessment eliminates areas of poor resource or other siting flaws as described below.

- Transmission and Injection Capacity – Nearby electric transmission infrastructure is necessary to connect a project to the power grid. A project substation and additional transmission lines are often necessary, however the cost required to connect a project to the grid increases with the distance over which project-specific transmission must be built.
- Land availability – Large open areas are necessary for utility-scale solar facilities. Cities, suburbs, and areas of active residential development are typically eliminated in the first phase of the search for an eventual project site.

Phase II

The second phase of assessment is a more focused evaluation of areas identified as feasible in Phase I.

- Land use – Large tracts of open land must be available to support the responsible siting of solar panels. Agricultural land is ideally suited for solar farms.
- Community – Castle Rock Solar values working with communities that welcome solar projects and responsible economic development opportunities.
- Potential host landowners – Prospective landowners are visited to gauge interest in hosting project facilities.
- Environmental concerns – A site suitability tool is run to screen for environmental factors including, but not limited to, wetlands, waterways, trees, critical habitat, endangered species and animals,

and hydric soils. The Project Area selected had few environmental factors of potential concern, and those factors identified can be avoided by placement of the solar PV array.

- Cultural and Historic Resources - Archaeological, cultural, and historical resources were considered during the site selection and Project design. The areas selected will not impact known archaeological, cultural, or historical resources.

- Constructability – Topography (elevation and slope), as well as soils and subsurface geology are reviewed at a desktop level. Detailed field analyses are performed later in the development process.

- Road infrastructure – Highways and roads within the proposed Project Area are reviewed for compatibility with large construction vehicles and delivery trucks. Main highways feeding into the area from major ports or rails are also considered for delivery of panels and other components.

The evaluation that led to the final site selection was a mix of both quantitative and qualitative functions described above.

Phase III

The final phase of preliminary site assessment often overlaps with the tasks outlined in Phase II. Landowner commitments are signed. Resource assessments, feasibility, suitability, and environmental reviews are performed in the field.

One of the most significant factors enabling solar development in this region has been the dramatic decline in the cost of large solar systems, due to a combination of improving technology, equipment, and installation methods. Economies of scale make Minnesota-based projects cost competitive with traditional forms of energy generation.

The proposed Project was identified following a rigorous analysis of three key factors: the existing transmission grid in Minnesota, the suitability of available land, and the receptiveness of the community.

- With respect to the grid analysis, Castle Rock Solar looks for injection points where the existing electrical infrastructure is robust. This minimizes the interconnection facility costs and network upgrades frequently attributed to new generating facilities. In addition, Castle Rock Solar prioritizes projects where land is available adjacent to the POI to minimize the length of high voltage transmission generation tie lines and the number of structures that support them. For the Project, the projected network upgrade costs are anticipated to be minimal, and the Project substation will be located less than 200 feet from the existing Xcel Energy Chub Lake to Hampton Corners 345 kV transmission line for the preferred Project substation location and 1,450 feet for the alternate Project substation location, minimizing the distance required for high voltage infrastructure.

- With respect to suitability of available land, solar farms are best sited on tracts that are relatively flat or with a slight southern aspect. The use of cleared land minimizes impacts from shading and the need to remove trees. It also significantly reduces the likelihood that sensitive flora or fauna inhabit the area.

- With respect to receptiveness of the community, Castle Rock Solar places great importance on community-supported projects. In order to be a good neighbor, it is important that the project start on the right foot by being transparent and being in regular communication with the public.

The area ultimately selected and evaluated for the Project encompassed approximately 2,500 acres all within proximity to the proposed POI to the grid at Xcel Energy Chub Lake to Hampton Corners 345 kV transmission line located along 230th Street West between County Road 79 on the east and Biscayne Avenue on the west. The total acreage of the facility proposed within this application was evaluated based on topography, environmental concerns, land rights, proximity to the POI, and willing landowner participation.

3.1.2 PRIME FARMLAND & AVOIDANCE AND MINIMIZATION OF AGRICULTURAL IMPACTS

Subject to certain exceptions, Minn. R. 7850.4400, subp. 4 prohibits large energy power generating plants from being sited 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 Rule*)*. The Prime Farmland Rule does not apply to the area within home rule charter or statutory cities; areas located within two miles of home rule charter or statutory cities of the first, second, and third class; or areas designated for orderly annexation under Minnesota Statutes, section 414.0325.

The Project is located directly adjacent to the City of Farmington, which, according to the 2020 federal census, had a population of approximately 23,632 people[8] thereby qualifying as a second-class city (citation of: Minn. Stat. § 410.01 or [9]). Accordingly, the Prime Farmland Rule does not apply within the City or the area within two miles of the City, which encompasses each of the two potential points of interconnection and approximately 740.6 acres (or 79%) of the Development Area. Castle Rock Solar sought landowners who were in the 2-mile buffer and avoided orderly annexation areas identified in the

City of Farmington 2040 Comprehensive Plan, none of the Site Control Area is located within an orderly annexation area or is otherwise targeted for City growth through 2040 and beyond.

Approximately 193.3 acres of the Preferred Development Area is located outside of the two-mile buffer of the City. Within this area, there is approximately 33.6 MW_{ac} of nameplate capacity planned on approximately 103.1 acres of Prime Farmland. Given the up to 33.6 MW_{ac} net generating capacity of the portion of the Project located outside of the 2-mile buffer of the City, the Prime Farmland Rule would allow use of up to 16.8 acres of Prime Farmland for that portion of the Project. These acreages of Prime Farmland would be temporarily taken out of agricultural production for the approximate 35–45-year life of the Project but would not be permanently removed from future agricultural uses. Map 6a and 6b in Appendix B provide the Regional Prime Farmland map in the vicinity of the Project Area.

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[8] US Census Bureau Data. Accessed https://data.census.gov/profile/Farmington_city,_Minnesota?g=160XX00US2720618.
[9]Office of the Minnesota Secretary of State. Available online at: https://www.sos.state.mn.us/media/1351/chapter-7b_local-govs-2015.pdf. Accessed September 2024.

The Prime Farmland Rule provides an exception in the event that a feasible or prudent alternative cannot be identified for projects or portions thereof located outside of areas not subject to the Prime Farmland Rule. Castle Rock Solar was not able to find enough suitable land that did not encroach upon city development, residential areas, and annexation areas owned by landowners willing to lease/easement within the 2-mile buffer. However, it is critical for the Project to maximize the full 150MW_{ac} available at the point of interconnection and for the Project to be as contiguous as possible to ensure efficient use of resources. Therefore, there is no feasible or prudent alternative for that portion of the Project located outside of the two-mile buffer. In any event, the Project is exempt from the Prime Farmland Rule for portion of the Project located within the two-mile buffer of the City.

3.1.3 MITIGATION AND OFFSETTING BENEFITS

Potential impacts on agricultural soils will be minimized and mitigated by implementing the AIMP (Appendix D) and the VMP (Appendix E) developed for the Project which are further described in Section 3.1.3.1 and Section 3.1.3.2 respectively. These include measures to conserve and segregate topsoil, alleviate soil compaction, protect existing drainage tile and irrigation systems, prevent the introduction of weeds, retain existing soil productivity, and restoration of the site upon decommissioning at the end of the life of the Project. Implementation of proper topsoil segregation, soil decompaction, drainage, and weed controls will help ensure post-construction revegetation success and productivity, thereby minimizing the potential for long-term impacts on agricultural lands.

3.1.3.1 Agricultural Impact Mitigation Plan

The Applicant has developed an AIMP (Appendix D) to identify measures to avoid, mitigate, repair, and/or compensate for potential agricultural impacts that may result from the construction, operation, and eventual decommissioning of the Project. The AIMP describes the Best Management Practices (BMPs) that will be used during construction, operation, and decommissioning to minimize long-term impacts to soil. Construction BMPs include, but are not limited to, an onsite environmental monitor to inspect earthmoving activities, soil segregation and decompaction, avoidance of wet weather conditions, and erosion and sediment control. Upon decommissioning, the solar facilities would be removed, and the site would be restored in accordance with the Decommissioning Plan (Appendix H) and the VMP (Appendix E).

3.1.3.2 Vegetation Management Plan

The Applicant has developed a VMP for the Project (Appendix E). The purpose of the VMP is to provide details regarding how to establish and maintain low-growing regionally appropriate grass-dominated vegetation within the array field and along buffers to meet or exceed requirements of the NPDES permit. Short-term and long-term vegetation management will be guided by performance standards outlined in the VMP. Castle Rock Solar will seed with seed mixes according to the VMP on as many acres as practicable during the pre-construction and construction phases of the Project to provide soil stabilization, meet NPDES and the Project-specific SWPPP requirements, and minimize post-construction re-vegetation efforts.

The main objectives of the VMP are to establish grass dominated vegetation within the Project to stabilize the soil, minimize the presence and abundance of noxious weeds, and to protect existing natural areas within and adjacent to the site from construction and operation impacts. Details regarding site preparation,

seeding methods and mixes, monitoring and maintenance of vegetation, and adaptive management techniques can also be found in the VMP. Vegetation establishment will provide benefits such as soil stabilization and erosion control, wildlife habitat, improvements to ground and surface water quality, and a reduction in fertilizer and pesticide applications.

3.2 ALTERNATIVE SOLAR PROJECT SITES CONSIDERED BUT REJECTED

Pursuant to Minn. Stat. § 216E.04, subd. 2(8), and Minn. R. 7850.2800 to 7850.3900, LEPGP that are powered by solar energy qualify for the alternative review process, which eliminates the obligation for an applicant to propose alternative sites within the application. As discussed further in Section 3.1.1, Castle Rock Solar selected the proposed Project site based on a variety of factors, including willing landowners, environmental characteristics, and proximity to the point of interconnection. The proposed Project site was identified based on these factors, and no specific alternative sites for the Project were considered.

3.3 FUTURE EXPANSION

The Applicant's interconnection request is for 150MW_{ac}, and there are currently no plans for future expansion of the Project.

4.0 ENGINEERING AND OPERATION DESIGN

Solar electric panels create electricity directly from sunlight. When sunlight hits the panels, semiconductors inside the solar panels are activated to produce direct current (DC) electrical power. The panels are mounted on single-axis tracking systems which run north to south. Throughout the day the panels rotate from east to west to follow the sun. Blocks of panels are electrically connected in series and terminate at an inverter. Inverters convert the DC power from the panels to alternating current (AC) power. Electrical collection cables connect the inverters to the Project substation, where the power is then stepped up at the Project substation's main power transformer from 34.5 kV to 345 kV where it is then transmitted by the Project's 345 kV Gen-Tie Line to Xcel Energy's Chub Lake to Hampton Corners 345 kV transmission line. The energy generation process is shown in Figure 2 (adapted from EEP 2023). The planned output for the solar energy generating system is up to 150 MW_{ac} of nameplate solar-energy capacity as dictated by the MISO interconnection request, J2027 2021-07-20, and the generator interconnection agreement for the Project.

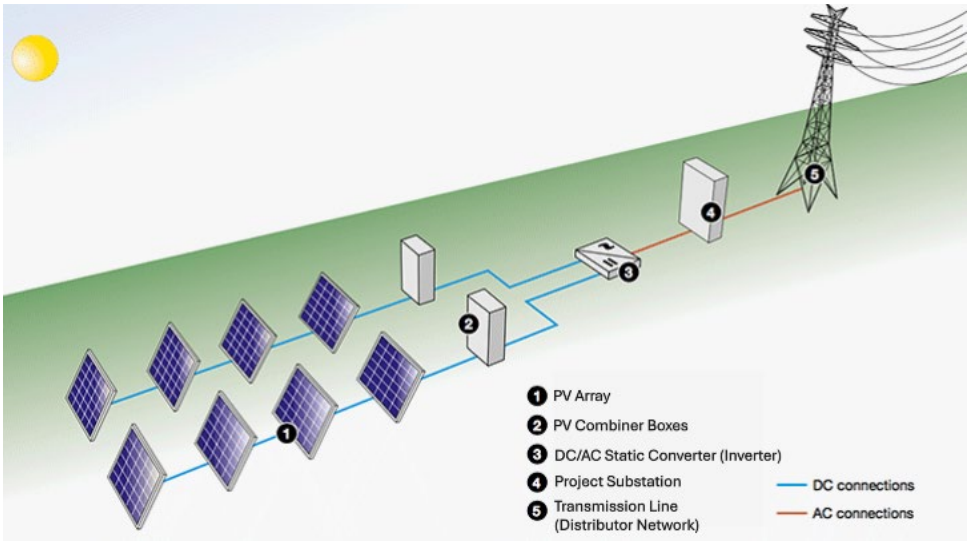


Figure 2: Energy Generation Process

4.1 DESIGN

The Project's primary components consist of solar panels, a tracking rack system, inverters, step-up transformers, MET station, fencing, an electrical collection system, O&M facility, Project substation, and interconnection facilities. Supporting facilities also include a supervisory control and data acquisition (SCADA) system, metering equipment, access roads, several weather stations, stormwater basins, laydown yard, and other infrastructure typical of a utility-scale solar facility. The current layout and proposed equipment are preliminary and subject to change as the design advances.

The Project will include a perimeter fence that will be gated at access points and will include security locks. The Project substation will be fenced according to the National Electrical Code and National Electrical Safety Code. The fence will be properly grounded to avoid any hazards. The substation will also have safety lighting and may have security cameras mounted at fence gates. Fixtures used to light the Project Area will limit lighting of the night sky and will be directed away from adjacent properties and public ROWs to prevent light from trespassing or spilling onto those properties. Any lighting used on site will comply with all applicable rules and regulations.

Disturbed areas will be re-vegetated with low-growing seed mixes (e.g., short grasses or low-growing forbs, low-growing wetland seed mixes (where appropriate), or some other low-growing perennial cover) as described in the AIMP and the VMP (see Appendices D and E). In some areas, trees and shrubs may be planted to provide screening between the Project and nearby residences.

To limit reflection, solar PV panels are constructed of dark, light-absorbing materials. Panels currently on the market reflect as little as two percent of the incoming sunlight depending on the angle of the sun and assuming use of anti-reflective coatings.

It is expected that at the main laydown area lighting will be used during construction only and will be installed either on pole(s) or on the construction trailers to provide adequate light for safety and security. Construction is planned to be conducted during daylight hours and therefore will not require additional site lighting. In the event that site lighting is needed to accommodate safe working conditions for construction, portable lighting and generators may be used as needed.

4.1.1 PHOTOVOLTAIC ARRAYS AND SOLAR FIELD

A specific PV solar module has not yet been selected for the Project. The PV module selected for the Project will be thin-film technology (cadmium telluride) with approximate dimensions of 3.9 feet by 7.5 feet (1.2 meters by 2.3 meters), or crystalline plate glass modules with an aluminum frame which is expected to have similar dimensions as the thin-film panels. The PV modules will be connected in series for up to 1500V operation and will be mounted on a tracker system in-line and oriented such that the long side of the module is facing adjacent modules on racking which tracks east to west to follow the sun throughout the day. The final selection of the PV module and inverters will be made at a future date based on the available market offering. The First Solar Series 7 540-Watt module and the Solarware Ninja inverter were used as the basis of the preliminary Project design. Figure 3 shows the typical solar tracker row design with mounted modules. The final module selected is expected to have similar physical construction and electrical characteristics.

Figure 3: Typical Solar Tracker Row Design

Figure 4 shows a typical solar tracker profile.

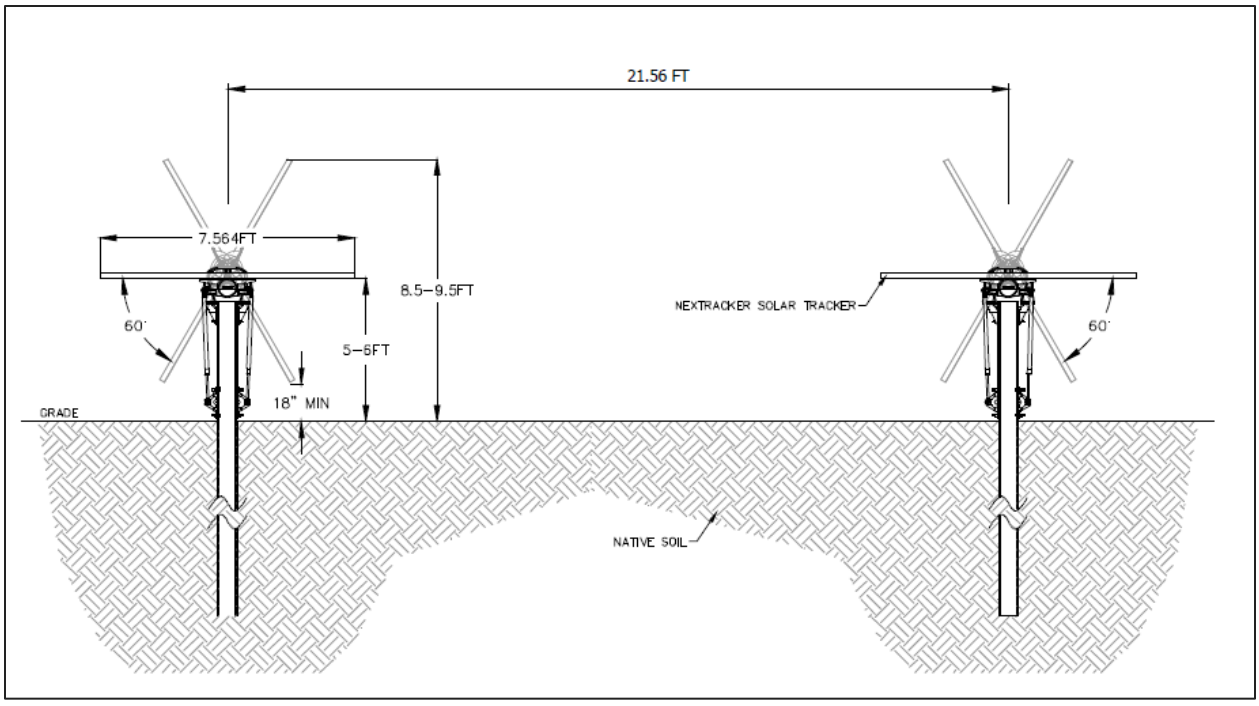


Figure 4: Typical Solar Tracker Profile

The solar panels will be mounted on a steel and/or aluminum tracking rack frame that is positioned approximately 4.75 to 6 feet from the finished ground with a +\- 60-degree range of motion (single axis tracking) driven by electric motors. The single axis tracking rack system is anticipated to be mounted on steel support posts driven into the ground or screw driven helical piles. To the extent practical, the racking system foundations will be a driven pier and/or screw driven helical piles and will not require concrete, although some concrete foundations may be required depending upon site specific soil conditions and geotechnical analysis.

The horizontal tracker would be in its highest position during the morning and evening hours when the trackers are tilted at their maximum angle and would be a maximum of 9 to 12 feet (2.75 to 3.7 meters) above the ground surface. The bottom edge of the modules will be a minimum of 18 inches above grade at maximum tilt, and a minimum of 5.5 feet above grade when tilted flat at mid-day. However, final design may include panels that have a maximum height of 18 feet.

The variability in height is due to the panel configuration of the racking system in portrait orientation. A portrait configuration racking design has a single row of panels arranged in portrait tracking east to west. The long axis of the panels would be perpendicular to the axis of the tracking system. The panels would be approximately 4.75 to 6 feet above grade when tilted flat at mid-day in this design. A racking system with a two in-portrait design may also be selected. This system holds panels in portrait configuration with a long axis that is perpendicular to the tracker. The two in-portrait configuration requires taller piles and results in a taller overall system, but also provides for wider aisles. Final racking system design will be selected prior to construction.

A total of approximately 375,000 modules are estimated for the basis of design for this application. This estimated number of modules is approximate and is subject to change based on the final design for construction. Trackers are arranged in north-south rows and pitch between rows estimated between 15 feet and 25 feet from one another. The trackers are arranged in circuits and blocks, that are separated by roads or AC collection system corridors. The piles will run north to south along the row of modules that are mounted on rails affixed to torque tubes mounted on the piles. If it is determined in final design that the cables will be underhung on the tracking racks, this steel structure would include an integrated cable management solution in order to support the insulated copper DC string wire which interconnects each of the PV modules.

The PV modules will be installed using industry standard, best practices. Upon completion of the final site design, pile lengths will be specified to allow the PV module racking system and tracker to be constructed at a minimum height above surrounding grade in order to account for average snow accumulation at the Project Area. Solar O&M procedures also call for modules to be placed in stow position to avoid snow accumulation during snow events and snow removal between arrays may be conducted on an as needed basis.

4.1.2 ELECTRICAL COLLECTION SYSTEM

The current configuration for the collector system contains a bulk total of approximately twelve and a half miles of cables consisting of three single conductor cables running in a bundle (one circuit) or a single cable containing all three conductors.

The collector circuits are planned as an underground system with direct buried cables or cables installed in direct buried ducts. The preliminary design assumes the conductor will be aluminum. Insulation will consist of 35kV TRXLPE, 100 percent insulation (1/6 or 1/3 concentric neutral depending on wire size) with a PVC jacket overall. Cables are MV-105. Final specifications will be determined during the detailed engineering phase. Collector circuits may be underhung on the tracking racks rather than buried. Collector circuits would then be buried where they commence from the racks to the inverter and from the inverter to the Project substation. Collector circuits may also be installed via aerial span over the South Branch Vermillion River and include bird diverters to make the lines more visible to birds. A typical aerial span pole for a 34.5kV collection line is approximately 110 feet in height which will accommodate the approximate 1,400-foot to 1,450-foot crossings (see Figure 7 below).

The collection system will either be buried at a depth of at least 36 inches to the top of the cables or will be enclosed within a conduit and buried at a depth of at least 24 inches. These depths meet minimum cover requirements as specified in Table 300.50 of National Electric Code 2017, Chapter 3 “Wiring Methods and Materials.” Where cables are installed via trench method, the trench for the cable will be eighteen inches wide. Where multiple cables are installed parallel to each other, the cable separation will be up to eight feet apart, therefore, the width of the trench will vary depending on the number of circuits within the trench. Figure 5 shows a typical multiple parallel trench schematic.

Where the collection system is installed via horizontal directional drilling (HDD) or bore method, the bore pits excavated for the entrance and exit of the horizontal directional drilling components will be placed in upland areas. A typical bore pit is approximately 10 feet by 20 feet. All materials removed from bore pits

will be used as backfill of the pit upon completion of the bore. Figure 6 shows the typical bore method at a waterway crossing.

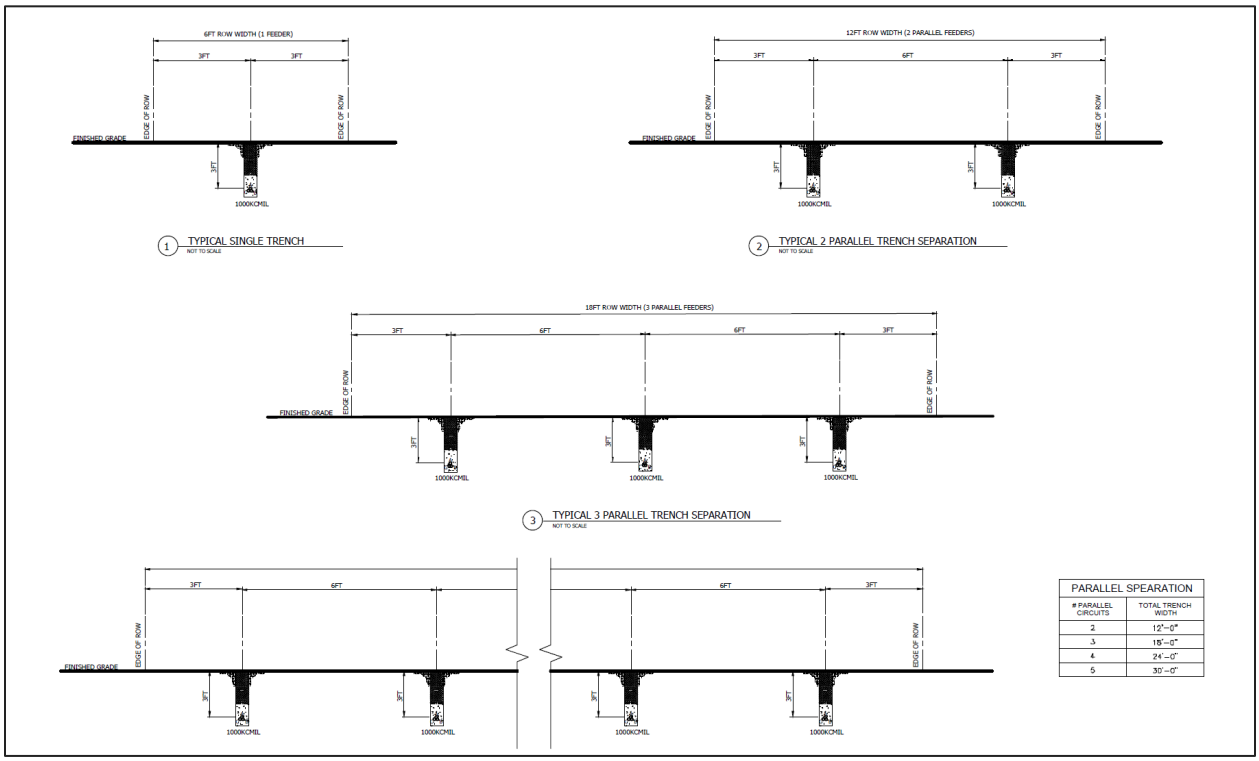


Figure 5: Typical Multiple Parallel Trench Separation

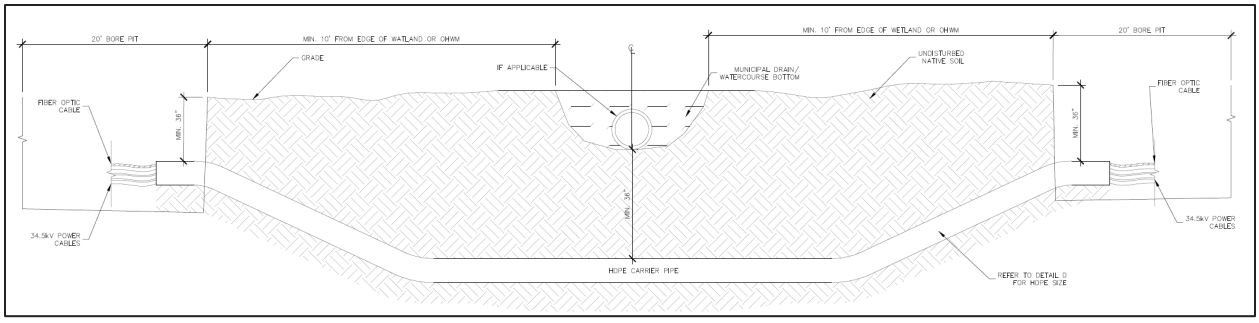


Figure 6: Typical Bored Watercourse Crossing

Installation of the collection system will be by use of a vibratory plow or trenching methods in upland areas, farmed wetlands, and the agricultural drainage ditches within the Project. The vibratory plow directly impacts an area approximately 12 inches wide and a trench method impacts an area approximately 18 inches wide. Underground HDD will be utilized in environmentally sensitive areas, such as nonfarmed wetlands and natural waterways, to avoid impacts to these resources.

The South Branch Vermillion River will either be bored or utilize an aerial span crossing. A typical drawing of a pole similar to what is expected to be installed if the collection line is aerially spanned over the South Branch Vermillion River is shown in Figure 7.

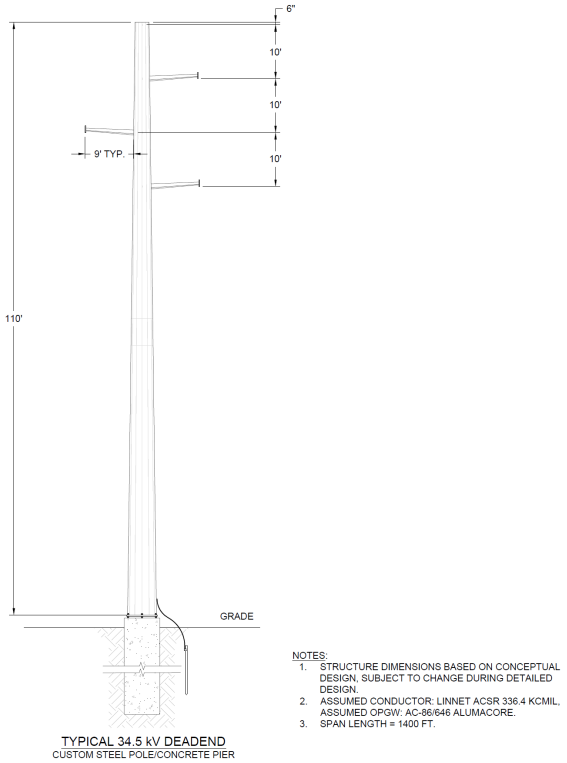


Figure 7. Typical Aerial Span Pole for 34.5 kV Collection Line

Figure 8 is a representative photo of the Vermillion River South Branch where the collection lines would cross. In the Project Area, the surrounding wetland is dominated by non-native reed canary grass and the river channel is narrow, becoming indistinct in places, and supports little to no recreation.

Figure 8. Photo of Location Where Collection Line May Span over South Branch Vermillion River

Castle Rock Solar has had discussions with the participating landowners and understands that drain tiles are minimal in this area. Further field investigation of drain tile networks will be conducted prior to construction if necessary. Upon satisfactory mapping of active (functioning and necessary) drain tile locations, considerable care during construction will be taken to: a) avoid drain tile locations which are within the Project Area, b) re-route drain tile away from locations which could be damaged during construction, or c) in the case of fields with pattern tile networks, work with applicable landowners to establish acceptable criteria for rerouting, replacing, or abandoning in place drain tile that is within a PV array.

If drain tile is damaged, the damaged segments will be repaired in place or, if necessary, relocated as required by the condition and location of the damaged tile. In the event drain tile damage becomes apparent after commercial operation, the drain tile will be repaired in a manner that restores the operating condition of the tile at the point of repair. All repair, relocation, or rerouting referenced above will be consistent with these policies: a) materials will be of equal or better quality to those removed or damaged; b) work will be completed as soon as practicable, taking into consideration weather and soil conditions; c) work will be performed in accordance with industry-accepted, modern methods; and d) in the event water is flowing through a tile when damage occurs, temporary repairs will be promptly installed and maintained until such time that permanent repairs can be made.

4.1.3 PROJECT SUBSTATION AND SWITCHYARD

The Project substation and switchyard will be located within the central portion of the Project Area, See Appendix B, Maps 1, 2, 3a, 3b, 4a, and 4b. The preferred and the alternate Project design includes an up to 6.0-acre Project substation and an up to 6.0-acre switchyard. Both the preferred and alternate Project substation and switchyard locations are sited on cultivated cropland. No wetland or waterway impacts are anticipated on the substation site, regardless of its location. The final substation location will be determined during the final design stage of the Project.

The Project substation and switchyard location will be graded and overlain with crushed rock to minimize vegetation growth in the area and reduce fire risk. The fenced area of the Project substation and switchyard footprint will be approximately 680 feet by 775 feet in size for the Preferred and Alternate Project design (subject to final Project substation design and layout). The Project substation will require a seven- to eight-foot-high chain link fence which may include three strands of barb wire at the top.

The Project substation includes one 345 kV circuit breaker, one 34.5 kV/345 kV generator step-up transformer, relays and protective equipment, SCADA equipment, telecommunication equipment, and metering equipment. Secondary containment areas for the transformer will be installed as necessary.

Both the Preferred and Alternate Option layouts for the Project have proposed POIs via a 138kV gen-tie line that connects to Xcel Energy's existing Chub Lake to Hampton Corners 345kV transmission line that runs along 230th Street West and bisects the Project Area. The Preferred Option would utilize an approximately 200-foot long gen-tie line while the Alternate Option would utilize an approximately 1,450-foot-long gen-tie line. The gen-tie line for either option would utilize poles that are similar in height to the existing Chub Lake to Hampton Corners 345kV transmission line.

The proposed 345kV switchyard is arranged in an initial three (3) position, future four (4) position ultimate ring bus configuration with a single generator incoming line position and two transmission line positions. A typical image of a 345 kV switchyard is provided in Figure 9. The proposed switchyard also includes a control building that will have control and protections panels, IT Comm/RTU panels, main termination cabinets, and AC/DC station service equipment including battery and charger.

Photo source: Michael Corp.

Figure 9: Typical 345 kV Switchyard

A typical construction sequence for the Project substation and switchyard involves, in order: site grading work, below-grade foundation installation, above-grade physical construction of buswork and installation of major electrical equipment, wiring and completion of all terminations, followed by testing, commissioning, and ultimately energization. A site-specific construction specification and schedule will be developed closer to the start of construction. All contractors will be required to follow the SWPPP, as well as adhere to any site-specific environmental requirements including erosion and dust control. The Project substation will always be accessible for operations and approved parties using the Project's access roads.

4.1.4 ASSOCIATED FACILITIES

The Project infrastructure will also include an O&M Facility, approximately 40 inverters and transformers, security fencing/gates, temporary laydown yards, several weather stations, and gravel access roads. One weather station will be utilized during preconstruction and one weather station for every 30 MW_{dc} will be installed for operation of the facility. The weather stations, in operation, may be placed on grass or stone and will likely be located near inverters.

Each inverter pad will also include one transformer to which the inverters will feed electricity (Figure 10). Inverters convert the DC output of the panels to AC, which is required for delivery to the electrical grid. After the inverter has converted the electricity, the electricity is stepped-up via a transformer from low voltage to medium or intermediate voltage (up to 34.5 kV). The final number of inverters for the Project will depend on the inverter size, inverter and module availability, as well as the final array configuration. The inverters currently under consideration are Solarware Ninja 4.2VA central inverters. The dimensions of the representative inverter are 6.5 x 3.6 x 3.6 feet (H x W x D). The Applicant has considered the costs and performance of several inverters as well as environmental and safety standards when making the decision of selecting this inverter.

The preliminary design assumes that all collector cabling will be installed below ground to represent the maximum potential impacts and has proposed 40 inverters mounted on driven piers and will not require a concrete pad. However, during final design it may be determined that all or a portion of the DC cable

between the modules and the inverters will be underhung on the tracking racks rather than buried. A typical diagram of underhung cabling is provided in Figure 11. Medium voltage alternating current cabling which commences from the inverters and runs to the main power transformer at the substation will be buried underground. The number of piers needed for each inverter mount will be determined based on geotechnical investigations conducted prior to construction. These piers provide the foundation for the inverter, transformer, and the SCADA system.

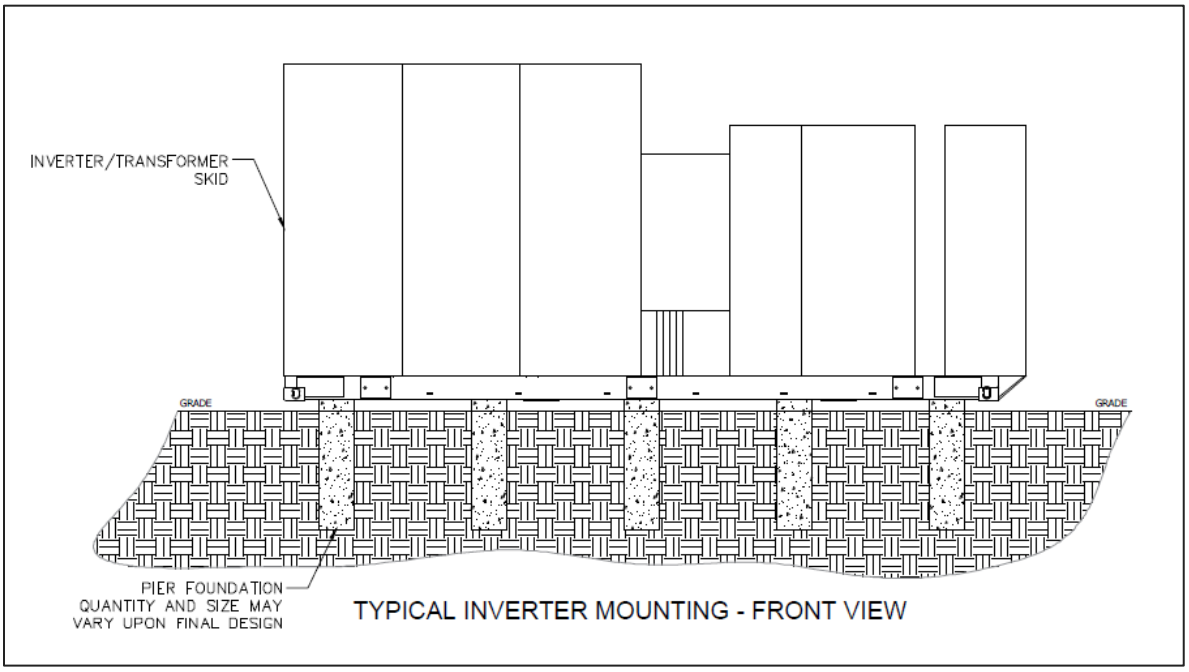


Figure 10: Typical Inverter Mounting – Front View

Source: Solar Power World

Figure 11: Typical Underhung Cable Scenario

4.1.5 OPERATIONS AND MAINTENANCE FACILITY

The proposed O&M Facility will be a modular building and may house a remote monitoring SCADA system which will monitor the solar panels and other equipment. If the SCADA system is not housed at the O&M facility, it would be housed at the Project substation. The O&M facility will also provide a location for storage and maintenance of equipment, and meeting space and parking for personnel. Castle Rock Solar will locate the O&M facility near the Project substation and switchyard area on approximately 0.9 acre with a 25-foot x 56-foot area that will be leveled to accommodate a building footprint of approximately 40 feet x 16 feet. Castle Rock Solar will perform civil work necessary to provide a level surface. The O&M facility will be supported per building and local county standards using concrete or steel support beams as necessary. The placement of the structure on the site will be in conformance with all local and state building codes.

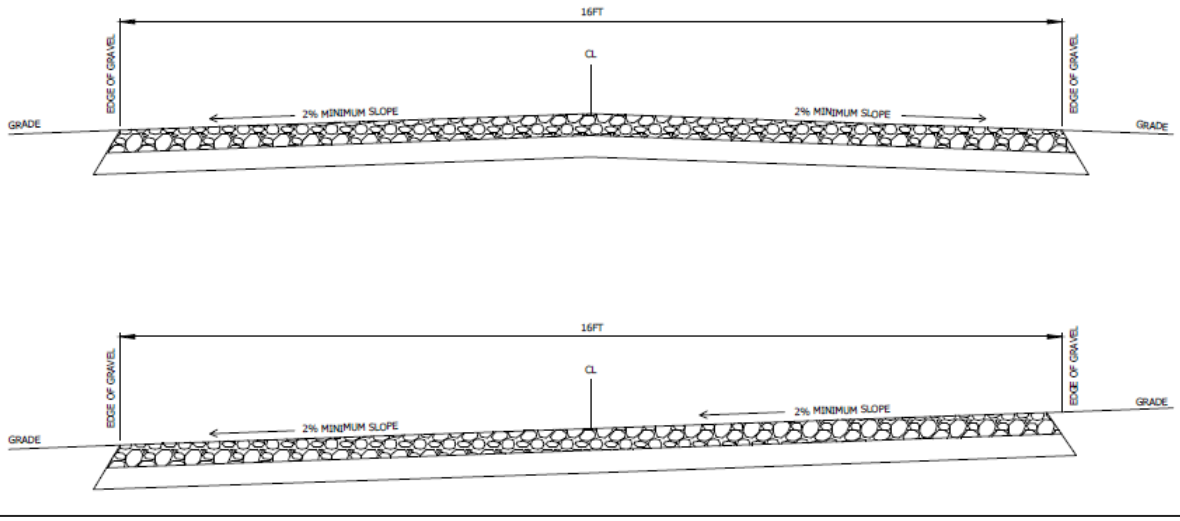
Final design decisions, including those related to O&M building, will not be made until after permitting has been completed and an EPC has been engaged to complete engineering/design. O&M building will be designed to follow all applicable state/local laws regarding water use and waste disposal.

4.1.6 ACCESS ROADS AND ROAD IMPROVEMENTS

Internal site roads will consist of a 16-foot-wide aggregate base with approximate 2-foot-wide shoulders on either side to provide site access during construction and operation of the Project. These roads may temporarily be wider during construction to accommodate construction equipment access where necessary. Aggregate materials will be used to develop the access roads. In these areas, topsoil will be stripped and stored for use during reclamation. Geotextile matting will be installed prior to placement of aggregate to prevent mixing with native subsoil. The aggregate would be maintained for the life of the Project. During

decommissioning at the end of the Project's life, these areas will be restored by removing the aggregate, decompacting the soil if required, restoring the topsoil and either seeding to permanent perennial vegetation or returning the area to agricultural production. Decommissioning activities for the Project are discussed in further detail in Section 4.4 and in the Decommissioning Plan in Appendix H.

A schematic showing a cross section of a typical access road is provided in Figure 12.



Typical Solar Access Road Profile

Figure 12: Typical Solar Access Road Profile

For access roads in areas with soil strength limitations that will be traversed a minimum number of times (i.e. one or two times) by construction vehicles, construction matting may be used to a limited extent during construction. In these areas, the existing soil surface will remain intact, planted in perennial vegetation and maintained for operation and maintenance once construction is completed.

Some upgrades or other changes to the public roads may be required for construction or operation of the Project. The Applicant will work with the applicable road authorities 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. The Applicant will obtain relevant permits from road authorities relating to accessing the Project through public roads, as well as installation of temporary facilities that may be proposed to occupy portions of public road ROW during the construction process. The Applicant will also obtain relevant permits and/or authorizations from road authorities relating to electric cables and/or feeder lines that may be placed in or across a public road ROW.

No pipelines will be built, accessed, or needed for construction or operation the Project.

4.1.7 TEMPORARY FACILITIES

Two laydown yards are proposed to support Project construction. Both will be temporary for the purpose of construction. The laydown yards will be fenced and used for equipment, construction materials and supply storage, temporary job trailers, and parking for Project-related vehicles. One approximate 5 to 5.6-acre laydown yard will be located adjacent to the Project substation near the entrance from 230th St. W. The second laydown yard will be located off of Biscayne Avenue and is approximately one acre in size. All laydown yards are currently in production as cultivated cropland. To prepare for the laydown yard, the site is cleared and graded to create a flat earthen surface. A layer of gravel or crushed stone may be used to create a stable and well-drained surface for the laydown yard. General laydown yard preparation will be completed in accordance with the SWPPP. See Appendix B, Map 1, 2, 3a, 3b, 4a, and 4b for the laydown yard locations.

4.2 PROJECT LAYOUT

The final Project layout will optimize electrical generation and efficiency of the Project while avoiding and/or minimizing human settlement, environmental, cultural resources, and infrastructure impacts. The Project's facilities will be sited to comply with the County's setback requirements, where feasible, and will also comply with other local, state, and federal regulatory standards. The preliminary Project layout can be found in Appendix B, Map 4a and 4b.

4.2.1 SETBACKS

The Project is considered a large electric power facility as defined in Minn. Stat. § 216E.01, subd. 6 and Minn. R. 7850.1000, subp. 10 and is therefore permitted by the Commission under Minn. Stat. Ch. 216E and Minn. R. 7850.2800-3900. While a site permit from the Commission preempts local ordinances, Castle Rock Solar has attempted to incorporate applicable county and township setbacks and ordinance standards. Castle Rock Township's Zoning Ordinance (Castle Rock Township 2021) does have setbacks specifically applicable to solar energy generation facilities or transmission lines. Castle Rock Solar has designed the Project to generally follow the recommendations in the Castle Rock Township Zoning Ordinance as well as the Dakota County Shoreland and Floodplain Management Ordinance, and the Vermillion Watershed Joint Powers Organization Rules. No above-ground Project facilities are located with a floodplain or shoreland zone. Collection line will be bored or aerially spanned in two locations crossing the South Branch Vermillion River.

Table 7: Setbacks

Feature	County Setbacks for Wholesale Solar Electric Systems (feet)	Distance to Closest Solar Array (feet)
Dwellings and other sensitive Receptors	300	341
Property Lines	50 feet from property lines without residential dwelling. 100 feet from property lines with a residential dwelling.	53 (without a residential dwelling)
Interstate, State, and County Roads	100	135
Wetlands	75	85
OHWM of a public watercourse	Perennial vegetative buffers of up to 50 feet along lakes, rivers, and streams.	136
Watercourses, ditches, and county tile mains	Perennial vegetative buffers of up to 50 feet along lakes, rivers, and streams and buffers of 16.5 feet along ditches.	61
Prohibited in the Floodplain Overlay District	0	85

4.2.2 SOLAR PROJECT DEVELOPMENT AREA

The Project encompasses 1,355 acres, approximately 935 acres would be developed to support the Project infrastructure. Table 4 summarizes the estimated acreage within the Project as it relates to Project components.

4.3 CONSTRUCTION, COMMISSIONING, RESTORATION, OPERATION, AND MAINTENANCE

The following provides a description of the staging and construction sequence for the Project:

- Pre-construction
  - Geotechnical investigation;
  - Underground utility discovery;
  - Design Project substation;
  - Design solar array, access roads, generation tie-line, and electric collection system; and
  - Procure necessary facility components (solar panels, tracking system, and transformers).

- Construction
  - Pre-vegetate and stabilize tillable acreage and areas lacking appropriate soil stabilizing vegetation, limited to areas where limited or no ground disruption will occur and consistent with the revegetation and restoration plan;
  - Stabilize construction entrances and exits;

  - Receive security fencing and gate materials;
  - Install perimeter security fencing and gates;
  - Remove vegetation in areas of construction and perform limited and localized grading as needed for staging and laydown areas and for transformer substation;
  - Develop the staging and laydown areas for receiving of construction materials and equipment, storage of the construction materials and equipment containers, location of construction trailers and parking for personnel and construction-related vehicles;
  - Survey and stake the access roads and panel locations;
  - Develop the access roads (limited grading is anticipated as roads will be constructed at grade when possible);
  - Delivery of equipment, including piles and potentially helical piers, aluminum supports/mounting structures, tracking systems and inverters. Because the Project will be constructed in blocks and multiple blocks will be constructed simultaneously as well as over time, deliveries will continue over time in advance of construction of the blocks;
  - Install driven piles or helical piers for a given block;
  - Install aluminum supports/mounting structures on to piles for a given block;
  - Install inverter pads for a given block;
  - Install tracking systems for a given block;
  - Delivery of PV modules and collection system equipment;
  - Install solar PV modules;
  - Install collection system by means of trenching and directional drilling;
  - Electrical testing and equipment inspections for each block and the collection system;
  - Receive materials and equipment for step-up transformer substation;
  - Install step-up transformer substation and connect collection system to transformer substation; and
  - Electrical testing and equipment inspections of transformer substation and connections to substation.

- Post-construction
  - Vacate and restore staging and laydown areas. De-compact the subsoil, with windrowed topsoil re-distributed and de-compacted again as needed;
  - Reseed and revegetate staging, laydown, and other disturbed areas consistent with revegetation and restoration plan; and
  - Begin commercial operation.

4.3.1 SOLAR PROJECT CONSTRUCTION, COMMISSIONING, RESTORATION, OPERATION, AND MAINTENANCE

4.3.1.1 Construction and Construction Management

The duration of construction for the Project is estimated to be 12-18 months including set up and demobilization. This timeline is in part dependent on winter weather conditions and the ability to work through the winter months.

During construction, the work force will be primarily comprised of laborers, equipment operators, and management personnel. The equipment operators will operate civil equipment, pile drivers, cranes, and material handling equipment. Most of the personnel required to construct this project will be laborers that install racking systems and place modules. Approximately 200-375 workers are anticipated to be needed to construct the Project during the entire construction timeline. The number of workers on the site at any particular time during construction will vary depending on the stage of construction, the timing of equipment deliveries and weather conditions. Once construction is complete, the facility will require approximately one full-time O&M manager, and anywhere between two to six solar technicians at a given time. The plant operator(s) will have specific training / expertise to run a solar facility.

The percentage of local labor used is dependent upon the local labor market and the availability of qualified employees at the time of construction. It is in the best interest of the Project to utilize local labor to the greatest extent possible in accordance with the Project's budget, timeline, industry standards and requirements, and corporate safety policies.

Construction equipment will include the following: graders, bulldozers, excavators, forklifts, trailers, plows, trenchers, pile drivers, and directional boring rigs. It is anticipated that most equipment will be initially delivered to the Project’s temporary laydown areas. Equipment will be transported from the laydown yards to the appropriate construction areas, as needed.

4.3.1.2 Inspections and Commissioning

Equipment inspections will be conducted prior to commercial operation of the Project. Inspection and testing will occur for each component of the solar array, as well as the associated communication, meteorological, collection, transmission, and SCADA systems. Testing, inspections, and commissioning will occur at periods during construction and upon completion of the construction phase. The estimated timeframe between Substantial Completion of the Project and Final Completion is approximately 30 to 90 days.

4.3.1.3 Site Restoration

Once the panels and associated facilities have been installed, site restoration will start by vacating and restoring staging and laydown areas. Subsoil will be de-compacted as necessary, and windrowed topsoil will be re-distributed and de-compacted again as needed. Castle Rock Solar has developed a site-specific revegetation plan that outlines seed mixes, installation and establishment details, and proposed long-term vegetation management specifications provided in Appendix E.

Castle Rock Solar will reseed and revegetate staging, laydown, and other disturbed areas consistent with the Project VMP. Vegetation management objectives have been developed for the pre-construction and construction phase, as well as post-construction short-term establishment and long-term establishment for the Project Area. In areas where no civil construction (grading) is required as part of the construction activities, Castle Rock Solar will establish perennial vegetation during the soonest available optimal seeding window to increase the probability of successful long-term vegetation establishment.

Portions of the site not utilized for the Project facilities or not impacted during construction will remain vegetated. These areas include most wetlands, forested lands, and other perimeter areas of the site. Agricultural areas that have limited vegetation and areas disturbed by construction will be seeded and stabilized throughout construction. To the extent possible, disturbance during construction will be phased to limit the amount of bare soil onsite at any one time.

After site disturbance and construction is complete in an area, a temporary cover of oats or annual rye will be planted to prevent soil erosion during construction. All disturbed portions of the site receiving seeding will be mulched, except for any areas where steep slopes are present. If steep slopes are present, wildlife compatible erosion control blanket will be installed. Certified weed-free hay or straw mulch will be used. Temporary erosion and sediment control BMPs will remain in place until 70 percent vegetation cover is established.

Upon completion of construction, all disturbed areas will be seeded with a perennial seed mix that complies with Minnesota Noxious Weed Law under Minnesota Statutes, Sections 18.75 to 18.91 regarding noxious weed seed content and labeling. Regionally appropriate grass-dominated seed mixes will be installed that are influenced by the guidelines outlined in the MNDNR *Prairie Establishment and Maintenance Technical Guidance for Solar Projects* (MNDNR Revised 2020). Castle Rock Solar will coordinate with the MDOC Vegetation Management Plan Working Group in finalizing the VMP.

Trenching restoration

Where trench methods are utilized for underground construction of collector circuits, the topsoil will be removed and segregated prior to installation. An average 18-inch-wide trench will be excavated, and the materials stockpiled in a nearby upland location. Once the circuits are installed, the trench will be backfilled and restored to match existing topography. Proper erosion control devices in the form of silt fence, straw bales, surface roughness, and temporary seeding will be used to stabilize disturbed areas near wetlands during construction and following the completion of the work. Monitoring of disturbed areas will occur until these areas have stabilized to 70 percent vegetative cover.

Drain tile

If drain tile is damaged, the damaged segments will be repaired in place or, if necessary, relocated as required by the condition and location of the damaged tile. In the event drain tile damage becomes apparent after commercial operation, the drain tile will be repaired in a manner that restores the operating condition of the tile at the point of repair. All repair, relocation, or rerouting referenced above will be consistent with the following policies: a) materials will be of equal or better quality to those removed or damaged; b) work will be completed as soon as practicable, taking into consideration weather and soil conditions; c) work will

be performed in accordance with industry-accepted, modern methods; and d) in the event water is flowing through a tile when damage occurs, temporary repairs will be promptly installed and maintained until such time that permanent repairs can be made.

Roads

As part of any road-use agreement, Castle Rock Solar will keep a record of the condition of the roads before, during, and at the conclusion of construction or of any major construction event. This will assist Castle Rock Solar, Castle Rock Township, and Dakota County in accurately assessing any possible damage to township and county roads. Castle Rock Solar will be responsible for the compensation for the repair of any such damage to at least original condition.

4.3.1.4 Operations and Maintenance

After solar arrays are installed, they must undergo O&M to function properly and meet energy production targets over the lifecycle of the solar system and extend its life. Conducting regular O&M ensures optimal performance of PV systems.

4.3.1.5 Supervisory Control and Data Acquisition System (SCADA)

Castle Rock Solar will use SCADA to achieve real-time supervision, control, and monitoring of plant operations. Its main objective is to optimize performance, guarantee energy efficiency, and prevent possible problems in the generation of the solar energy produced by the facility. By constantly monitoring the status of devices and environmental conditions, the SCADA system can detect anomalies and prevent potential failures before they occur. The SCADA system generates alarms and notifications in case of anomalies or unexpected events, allowing operators to take fast and effective measures to solve problems and minimize the impact on energy production. In addition, it enables predictive maintenance to be carried out, which reduces the costs and downtime associated with reactive maintenance. The SCADA system will reduce the need for human intervention in the photovoltaic plant, which lowers operating costs and increases the efficiency of the process.

4.3.1.6 Equipment Inspection

Prior to commissioning of the Project, testing and inspection of the facility will include:

- Electrical testing and equipment inspections for each block and the collection system;
- Electrical testing and equipment inspections of transformer substation and connections to substation;
- Inspection of tie-in to Xcel Energy's Chub Lake to Hampton Corners 345 kV transmission line; and
- Conduct interconnection inspections and testing and Project commissioning.

During Operation, inspection of the main equipment will occur at regular intervals, including:

- PV panels: visual check of the panels, tracking system, and surrounding grounds to verify the integrity of the panels and tracking structure and to check for the presence of animals and nests;

- Inverters, transformer, and electrical panels: visual check of the devices including connection equipment and the grounding network. Check for presence of water and dust;
- Electrical check: Check of the main switches and safety devices (fuses);
- Noise: check for abnormal sounds;
- Cabling and wiring: visual check of electrical lines and connection box to verify its status;
- Routine visual inspection of tie-in structures, and components; and
- Project substation: scheduled visual inspections.

4.3.1.7 Facility Maintenance

Maintenance activities will be conducted based on the NREL Best Practices for Operation and Maintenance of Photovoltaic and Energy Storage Systems (NREL, 2018). Maintenance activities will include access road, perimeter fence, and access gate maintenance, lighting system checks, and if needed, PV module washing. Castle Rock Solar will also monitor for any wildlife that may be present within the facility. The VMP in Appendix E describes short and long-term vegetation maintenance practices for the Project.

4.3.1.8 Maintenance Frequency

Table 8 provides more information on the anticipated frequency of the operations and maintenance tasks. The table represents the anticipated frequency of these tasks; the frequency of inspection may be varied based on facility demands and experience with performance of certain components and features.

Table 8: Operations and Maintenance Tasks and Frequency

Facility	Task	Anticipated Frequency
General	Safety Audits	2 x per year
	Environmental Compliance Inspections	2 x per year
System Protection	Protection Relays	Once every 2 years or as instructed by the manufacturer
	Breaker Trip Testing	Once every 2 years or as instructed by the manufacturer
	System Protection Potential Transducers and Current Transducers Calibration	Once every 6 years or as instructed by the manufacturer
	Telecommunications Equipment Inspection	Once every 4 years or as instructed by the manufacturer
Substation	Perform thermographic scan of substation components.	Annually
	Perform a remote breaker functional test. General inspections and cleaning of the grounding system, disconnect switches, circuit breakers, insulators, surge arrestors, O/H lines, control room, and fence/gates.	Annually or as instructed by the manufacturers
	Perform insulation resistance for all equipment at substation.	Once every four years

Facility	Task	Anticipated Frequency
Medium Voltage and High Voltage Breaker	Clean out dirt and debris. Perform a manual operation test. Perform an electrical test. Perform a gas leakage test.	Per manufacturer's recommendations
Generator Step-Up (GSU) Transformer	GSU Transformer	Per manufacturer's recommendations
AC Overhead Collection System	Perform infrared scan and visual inspection of the AC overhead collection system.	1 x per year
	Wash the phase insulators.	As needed
PCS Transformer	Perform visual and infrared scans on low side of transformer when power is >80 percent.	Per manufacturer's recommendations
	Perform oil sample analysis on PCS transformer(s). Collect PCS transformer oil sample(s) for 3rd party analysis.	Per manufacturer's recommendations
	Perform electrical test of transformer.	Per manufacturer's recommendations
Inverter	Inverter Visual and Thermal Inspections	Per manufacturer's recommendations
	Inverter Testing and Preventative Parts Replacements	Per manufacturer's recommendations
Combiner Boxes	Perform visual inspection of the physical condition of the combiner cabinet.	Annually
Harness Combiner Box	Perform visual inspections, IR scans, torque checks, and switch testing.	1 x per year
Tracker and Water Sensors	Perform visual inspection of tracking components; sync data with Operator's operations center. Verify stow functionality.	Per manufacturer's recommendations
	Tract Gear Box & Drive Shaft	Per manufacture's recommendations
DC Wiring	Visual inspection for damage. Visual inspection wire management.	1 x per year
PV Modules	Perform visual inspection of twenty five percent (25 percent) of PV Modules for signs of damage, degradation, delamination, and soiling.	1 x per year
Weather Station	Perform visual inspection of the physical condition of the unit and associated cabling. Calibrate sensors.	Weekly
Module Surface Temperature (MST)	Perform visual inspection of the physical condition of each MST and associated cabling Plant wide. Remove dirt and debris.	Weekly
Soiling Stations	Perform visual inspection.	Weekly
Other	Insultation resistance testing DC wiring. (25 percent/year)	Annual
	Grounding check, all elements. (25 percent/year)	Annual
	Torque check, all elements. (25 percent/year)	Annual

4.4 DECOMMISSIONING AND REPOWERING

At the end of the Project's useful life, the Applicant will either take necessary steps to continue operation of the Project (such as re-permitting and retrofitting, as needed) or will decommission the Project as described below and in the Decommissioning Plan included as Appendix H with this Application.

4.4.1 DECOMMISSIONING

The Project will operate for at least 35 years and the useful life of the Project may be 35 or 45 years based on current forecasts for modern equipment. At the end of the useful life of the Project, the Applicant will be responsible for removing all the solar arrays and other associated facilities and restoring the site to its prior use. At the end of the anticipated Site Permit, the Applicant reserves the right to extend operations of the Project by applying for an extension of the site permit to continue operation in conjunction with the Applicant's extension of the Project's leasehold and easement interests. Should the Applicant decide to continue operation, a decision would be made as to whether the Project would continue with the existing equipment or to upgrade the facilities with newer technologies. In general, the majority of decommissioned equipment and materials will be recycled. Materials that cannot be recycled will be disposed of at approved facilities.

At the end of the Project's useful life, the Project would cease operation. At that time, the facilities would be decommissioned and dismantled and the site restored in accordance with the Decommissioning Plan developed for the Project (Appendix H).

Decommissioning activities will begin within twelve months of the Project ceasing operation and are anticipated to be completed in 12 months, with monitoring and site restoration extending beyond this period to ensure successful revegetation and restoration. The decommissioning timeline is dependent on, among other things, weather conditions and any needed permitting. A partial list of activities include:

- De-energize solar arrays
- Remove panels and dismantle racking
- Remove inverters, transformers, and skids
- Remove access and internal roads
- Remove perimeter fencing
- De-compact subsoils, restore, and revegetate

Decommissioning of the Project is described in more detail in the full Decommissioning Plan, which is provided as Appendix H.

Castle Rock Solar will be responsible for all costs to decommission the Project and associated facilities. Under the requirements of the lease agreements, and consistent with EERA guidance and prior Commission site permits, a financial assurance is not anticipated during the first 10 years of operation, by which time Castle Rock Solar will have a detailed financial assurance plan. After that time, Castle Rock Solar plans to review and update the decommissioning plan and cost estimate every five years, in accordance with EERA recommendations. Subsequent revisions to the decommissioning plan and cost estimate may be needed based on changes in construction techniques and technology, as well as changing

material scrap or resale values. At this time, consistent with applicable real estate agreements, Castle Rock Solar anticipates the financial assurance will take the form of one or more, or a combination of, the following: corporate security bonds, self-bonds, collateral bonds, surety bonds, or other form of security reasonably acceptable. The amount of the financial surety will be determined in accordance with the decommissioning plan, as it is revised in accordance with site permit, during the life of the Project. Decommissioning of the site will comply with applicable regulations in effect at the time of decommissioning, as well as Castle Rock Solar's obligations under applicable real estate agreements.

4.4.2 REPOWERING

As the solar market continues to produce less expensive and more efficient solar modules, repowering the Project 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 Project, or increasing the generation output of the Project. Castle Rock Solar will continually evaluate the Project's generation output, maintenance costs, and other contributing factors in conjunction with available technology upgrades to determine if repowering the Project is a worthwhile investment. Any proposed repowering of the Project will abide by all local, state, and federal regulations. A new or amended Site Permit may be necessary and will be sought if required.

5.0 ENVIRONMENTAL INFORMATION

For existing conditions within the portions of land under the Applicant's control, area calculations are based on the Project Area (1,355 acres). The Project Area includes the anticipated Project Development Area (934.2 acres, the area needed for construction and operation of the Preferred Project design, and 933.5 acres needed for construction and operation of the Alternate Project design based on preliminary design), see Appendix B, Map 2. This reflects the fact that final design may necessitate additional development outside of the anticipated Development Area. The Project Area boundary is used to discuss the proximity of resources (such as parks, trails, and other natural resources) that are located outside the Project. The anticipated Development Area for the Proposed Project is used for approximating areas of permanent or temporary impact. Temporary impacts will be required outside the solar array area for the installation of two collection lines to connect solar array areas.

5.1 ENVIRONMENTAL SETTING

The Project is located in Castle Rock Township, Dakota County, Minnesota. The City of Farmington city limits are approximately 500 feet northwest of the Project Area, the unincorporated community of Castle Rock is approximately three miles southwest of the Project Area, and the City of Hampton is approximately 3.8 miles east of the Project Area.

The Ecological Classification System (ECS) was developed by the MNDNR and the U.S. Forest Service to map ecological patterns and recognize management opportunities through various environmental factors, including geology, topography, soils, hydrology, climate, vegetation, and land use. Through this system,

the state of Minnesota is broken down into smaller and smaller ecological areas through subsequent Provinces, Sections, and Subsections. (MNDNR 2023a).

According to the ECS and data available through the Minnesota Geospatial Commons, the entire Project Area falls within the Eastern Broadleaf Forest Province. Within this Province, the majority of the Project Area is located within the Minnesota & NE Iowa Morainal Section (222M) and the Oak Savanna Subsection (222Me) (MNDNR 2023a and MNDNR 1999). The Oak Savanna Subsection is characterized by loess plain over bedrock or till with moraines and outwash. The bedrock in this area consists of limestone, sandstone, and shale that may be exposed in some areas. Mollisols and Alfisols that range from wet to well-drained are the primary soils in the area. Drainage in the area is well developed and few lakes are present. Annual normal precipitation ranges from 28 inches in the north to 31 inches in the south with the growing season lasting between 146 and 156 days. As such, much of this Subsection is presently farmed; however, historically, bur oak savanna with some tallgrass prairie and maple-basswood forest were the primary vegetation (MNDNR 2023b).

One small section located in the southern portion of the Project Area between Alverno Avenue and Akron Avenue (south of 245th Street West) falls within the Paleozoic Plateau Section (222L) and the Rochester Plateau Subsection (222Lf) (MNDNR 2023c and MNDNR 1999). The Rochester Plateau Subsection is characterized by gently rolling older till plains. The bedrock in this area consists of dolomite, limestone, sandstone, and shale; bedrock exposure is common. Udalfs are the primary soil type. Like the Oak Savanna Subsection, few lakes are present in the Rochester Plateau Subsection and the drainage network is well developed. Annual normal precipitation ranges from 29 inches in the west to 34 inches in the southeast with the growing season length ranging from 136 to 156 days. As such, this Subsection is primarily farmland with some small oak openings and barrens remaining. Historically, oak savanna and tallgrass prairie were prevalent in this area (MNDNR 2023c).

According to recent aerial imagery from Google Earth Pro (2021) and data from the U.S. Geological Survey (USGS) National Land Cover Database (NLCD) (USGS 2019), the Project Area is primarily agricultural and pastureland, thus supporting data from the ECS. Additionally, patches of forested areas are present within the Project Area, primarily near sparse rural residences as windbreaks and near water features. Wetlands are also present within the Project Area, and the South Branch Vermillion River flows west to east through the north-central portion of the Project Area, which is within the Vermillion River watershed (Google Earth Pro 2021, USGS 2019, and BWSR 2016). Tributaries to the South Branch Vermillion River are also present within the Project Area, and the North Branch Chub Creek is located within one mile of the Project Area to the south. For roadways, 240th Street West bisects the Project Area north and south while the Project Area is bordered most closely by 225th Street West to the north, 260th Street West to the south, MN Hwy 3 (Chippendale Avenue West) to the west, and Audrey Avenue to the east (Google Earth Pro 2021). According to MnTOPO, the Project Area ranges from approximately 870 to 980 feet above mean sea level with the highest elevations in the southern portion of the Project Area. Elevation decreases moving north towards the South Branch Vermillion River, after which elevations again increase (MNDNR undated(a)). There are no known karst features within the Project Area; however, the Project is located at the northern edge of a karst area with two sinkhole features (field verified 2020) located approximately one-half mile to the south near the intersection of Alverno Avenue and 260th Street West (MNDNR undated (b)).

5.2 HUMAN SETTLEMENT

The Project Area is located in a rural agricultural community with homesteads interspersed throughout (Appendix B, Maps 2 and 3). Homesteads are generally excluded from the Project Area but are located adjacent to Project parcels. The Project Area is located in Castle Rock Township and is approximately 500 feet southeast of the City of Farmington's city limits and approximately 1.5 miles from the center of Farmington. The City of Hampton is approximately 3 miles east of the Project Area, and the unincorporated community of Castle Rock is approximately 4.3 miles southwest.

5.2.1 DISPLACEMENT

The Project will not result in any displacement of residences or other buildings.

5.2.2 PUBLIC HEALTH AND SAFETY

Primary public health and safety issues during construction and operation of the Project include injuries due to falls, equipment and vehicle use, electrocution, and fire. If emergency personnel and/or services were needed at the Project site, multiple services would likely respond, depending on the situation as described in Table 9.

Table 9: Emergency Services in the Vicinity of the Project

Type	Entity
County	Dakota County Sheriff Department
City Police Departments	Farmington Police Department Lakeville Police Department Rosemount Police Department Apple Valley Police Department Northfield Police Department Dundas Police Department Cannon Falls Police Department
City Fire Departments	Farmington Fire Department Northfield Area Fire and Rescue Cannon Falls Fire Department Randolph-Hampton Fire Lakeville Fire Department Rosemount Fire Department Apple Valley Fire Department.
Medical/Ambulance	North Memorial Aircare Lakeville, ALF Ambulance Cannon Falls Ambulance EMS-Northfield

Any of these services could be expected as all but the Dakota County Sheriff's Office are located within 10 miles of the Project Area. Additional details regarding public services and infrastructure within and adjacent to the Project Area are included in Section 5.2.10.

According to the Minnesota Department of Public Safety (MNDPS 2018), there are twelve Allied Radio Matrix for Emergency Response (ARMER) towers located within a 15-mile radius of the Project Area. The closest one is located approximately 4.8 miles east of the Project near Randolph, Minnesota. According to the Minnesota Department of Health (MNDPS 2018), the ARMER system is Minnesota's primary two-way 700-800 MHz trunked public safety radio system for all state agencies as well as all police, fire, emergency services, city, county, federal, and tribal governments. The ARMER radio system operates by line-of-sight communication to other ARMER towers. In order for the system to operate effectively, multiple towers are needed to produce a solid blanket of coverage. The system can be interrupted if tall objects are proposed within the line-of-sight, typically at or near the top of a tower over 150 feet tall.

Impacts and Mitigation

Construction and operation of the Project will have minimal impacts on the health and safety of the local population, and the level of use/service potentially needed by the Project is expected to be low. While difficult to quantify, an emergency incident or accident may occur during construction and would be addressed as needed by Project personnel and local responders (as required). Cooperation and training meetings with local emergency response providers will be organized and held to maintain familiarity with site facilities and clear channels of communication. A fire safety protocol for the Project will be made available to local fire departments. Castle Rock Solar also will develop an Emergency Response Plan with local authorities. Additionally, construction and operation will comply with all applicable local, state, and federal regulations. Standard industry practices will be followed during and after construction of the Project, including installation of a perimeter fence, access gates, proper signage, and site access only to authorized personnel. Due to the measures outlined above, it has been determined that the construction and operation of the Project will have minimal impacts on public health and safety.

Although there are nine ARMER towers within a 10-mile radius of the Project Area, the Project's components are not expected to impact this communication system due to the height of the proposed facilities. The maximum height of the solar panels when positioned at their highest apex will be 9 to 12 feet. However, final design may include panels that have a maximum height of 18 feet. The height of the poles that may be used to span the South Branch Vermillion River are approximately 110 feet which is less than Xcel Energy's existing Chub Lake to Hampton Corners 345kV transmission line that runs along 230th Street West and bisects the Project Area. A typical crane used for the site would be approximately 75 feet in height.

The solar array perimeter security fence around the solar array will be 8 feet high. The Project substation will require a seven- to eight-foot-high chain link fence which may include three strands of barb wire at the top. The facilities developed for the Project substation are expected to be up to 90 feet high. Therefore, no mitigation measures are expected to be necessary.

5.2.3 EMF

Electromagnetic fields (EMFs) produced by electricity are non-ionizing radiation, meaning the radiation has enough energy to move atoms in a molecule around (experienced as heat), but not enough energy to remove electrons from an atom or molecule (ionize) or to damage deoxyribonucleic acid (NC Clean Energy 2017). Modern humans are exposed to EMFs on a daily basis from sources including cell phones,

microwaves, dishwashers, refrigerators, fluorescent lights, power tools, and other household and workplace items. Some of these items have been shown to emit higher EMF intensities than solar facilities from outside the perimeter fence.

The strength of magnetic fields varies depending on many different factors, including the magnitude of the current and the proximity to an EMF source. Because magnetic fields decrease with distance from the source, the magnitude of the magnetic field is higher in homes near a power line than those further away. Similarly, levels near appliances or interior electrical wiring may be higher than an average mid-room reading.

The electric field under a high voltage transmission line is usually not more than 10 kilovolt per meter (kV/m) when measured 1 meter above ground. (In Minnesota, the lines subject to permits from the Environmental Quality Board have been restricted to a maximum of 8 kV/m). Because most materials shield the electric field, the typical electric field in a house does not exceed 100 V/m (Minnesota State Interagency Working Group on EMF Issues 2002).

In a study conducted by the Electrical Power Research Institute, spot measurements in 992 homes throughout the U.S. showed that half (50%) of them had magnetic field measurements of 0.6 mG or less, when the average of measurements from all the rooms in the home was calculated. These measurements primarily reflect the fields from internal household wiring, electrical grounding sources, and power lines. Exposures in occupational settings (e.g., working on a computer or operating a machine/tool) are typically much higher than residential settings (Minnesota State Interagency Working Group on EMF Issues 2002).

In 1998 a nationwide random survey of 1000 individuals was conducted to measure 24-hour time-weighted average exposures to magnetic fields (Zaffanella & Kalton, 1998). The geometric mean for this survey was 0.9 mG. Approximately 15% of the population was estimated to have exposures exceeding 2 mG; 2.4% had exposures exceeding 5 mG, and 0.4% had exposures exceeding 10 mG. The last value indicates that about 1 million people in the U.S. have an average 24-hour exposure greater than 10 mG. Peak exposures at a single point in time are often considerably higher due to people's exposures to appliances, wiring, and other sources. About 0.5% of the population had an estimated maximum (peak) exposure to magnetic fields of 1000 mG (Minnesota State Interagency Working Group on EMF Issues 2002).

An EMF Study has been completed for the Project and is provided in Appendix L. The results of this study show that the magnetic field at the edge of the underground collection line right of way ranges 11.61 to 17.21 mG depending on the number of cables running parallel in the trench, which for this Project design includes one to five circuits. The results in Appendix A of the EMF Study shows that at approximately 40 to 60 feet from the trench, depending on the number of cables in the trench, the magnetic field measurement approaches zero.

The overhead collection line is estimated to have a maximum electric field of 0.54 kV/m and a maximum magnetic field of 83.24 mG near the centerline.

The results of the EMF study shows that the electric field created by the 345 kV overhead gen-tie line is a maximum of 4.92 to 5.14 kV/m at the centerline and approaches 0 at approximately 200 feet. The magnetic

flux density of the overhead line is measured to be 148.85 to 155.19 mG at the centerline and approaches zero at a distance of approximately 200 feet from the centerline.

Impacts and Mitigation

The sources of EMF from the Project are a small amount of EMF from the collection line system connecting the solar panels and the overhead gen-tie connecting the Project substation to Xcel Energy's Chub Lake to Hampton Corners 345 kV transmission line. The collection system is planned to either be buried at a depth of at least 36 inches to the top of the cables or will be enclosed within a conduit and buried at a depth of at least 24 inches and there will be shielding around the cables. Final design may also include that the DC cables are underhung on the tracking racks between the PV modules and may be aerial spanned over the South Branch Vermillion River in two locations. Electric and magnetic fields weaken rapidly as the distance from the source of the fields increase. The electric field will be canceled out by the shielding of the cables and conduits. Electric fields are canceled by shielding through a process called electrostatic induction, where a conductor, like a metal shield, redistributes its charges on its surface when exposed to an external electric field, creating an opposing field that effectively cancels out the original field inside the conductor, resulting in a zero electric field within the shielded area. Both the electric and the magnetic field are expected to be mostly dissipated outside of the Project Area as described above and detailed in the EMF Study in Appendix L.

According to the U.S. Center for Disease Control (CDC), effects from non-ionizing radiation are not common (CDC 2022). Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results. Some have shown no statistically significant association between exposure to EMF and health effects and some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the U.S. Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe (Minnesota State Interagency Working Group on EMF Issues 2002).

5.2.4 NOISE

Noise is defined as unwanted sound in reference to the Project. Noise generated due to the construction and operation of the Project will comply with state standards. Noise will be measured using A-weighted decibels (dBA) which reflects the range of frequencies that the average human ear perceives. The A-weighted decibel is a logarithmic scale which reflects how humans perceive sound, putting more emphasis on the range of frequencies humans can hear. An increase in sound of 10 dBA, such as increasing from 50 to 60 dBA, would be perceived as twice as loud.

Pre-Construction Noise

The Project is located southeast of the City of Farmington, in a rural setting with agricultural activity and rural residences present. Common ambient sound sources include sound from farm equipment, including tractors, combines, trucks and other farm equipment; traffic on local roads; recreational vehicles including

snowmobiles; wind; and wildlife, among other sound sources. Rural communities typically experience ambient sound ranging from 30 to 60 dBA, with louder ambient sound closer to highways.

The sound pressure level, measured in dBA, of common noise sources are listed for comparison in Table 10 below (Occupational Safety and Health Association [OSHA] 2024, MPCA 2015). Noise levels below 45 dBA are generally considered low.

Table 10: Common Noise Sources

Sound Pressure Level (dBA)	Common Noise Source
0	Threshold of hearing
20	Quiet rural nighttime
30	Bedroom at night
40	Soft whisper – 5 ft away
50	Quiet urban residence - daytime
60	Conversation – 3 ft away
70	Vacuum cleaner – 9 ft away
80	Freight train – 100 ft away
90	Gas lawnmower – 3 ft away
100	Jet flyover at 300 m
110	Night club with music
120	Operating heavy equipment
130	Jet taking off – 200 ft away
140	Threshold of pain

Noise Standards

The MPCA adopted the noise standards to Minn. Stat. §116.07, subd. 2(c) set forth in Minn. R. Chapter 7030. These standards require dBA noise measurement specified for daytime and nighttime. Daytime is defined as 7:00 a.m. to 10:00 p.m. and nighttime is defined as 10:00 p.m. to 7:00 a.m. The MPCA noise standard for maximum allowable sound levels may not exceed 10 percent of the time for a one-hour survey for the L10 standard or exceed the L50 standard for 50 percent of the time for a one-hour survey based on the Noise Area Classification (NAC). The Project Area is classified as NAC 1. According to the Minn. Stat. §116.07 and Minn. R. Chapter 7030 noise ordinance, the Project has a daytime L50 noise allowance of 60 dBA and nighttime noise allowance of 50 dBA. Table 11 below depicts the MPCA state noise standards.

Table 11: MPCA State Noise Standards - Hourly A-Weighted Decibels

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

[1]NAC 1 includes rural residential household units.

Impacts and Mitigation

Construction Noise

Castle Rock Solar anticipates noise will be produced during the construction of the Project by construction vehicles and equipment. Construction will occur in phases, starting with site preparation activities, such as vegetation clearing, site grading, and access road construction. Construction of the Project substation along with trenching and installation of the underground electrical collection system will likely be occurring concurrently with the solar array installation activities. The construction process is progressive in nature; therefore, several locations will see activity at the same time with installation activities then progressing to other areas which will reduce high noise levels in any one area.

Noise impacts will be limited to daytime hours and occur temporarily during the construction of the Project. The sound levels will vary based on the construction activity occurring in the Project Area. Pile driving equipment used for the installation of piles for the solar arrays is the construction phase that generates the most noise. Construction noise will be more audible when louder activities (i.e., pile installation) is occurring near the perimeter of the Project Area; however, the equipment will only be in one location for a limited amount of time before construction progresses to other areas of the Project. Noise associated with construction will likely be perceptible at residences within and outside the Project Area. Sound levels decrease at a rate of approximately 6 decibels per doubling of distance from the noise source and a 10-decibel reduction in sound levels is perceived as half as loud (WKC 2024). Noise generated due to the construction of the Project will comply with the MPCA State Noise Standards outlined in Table 11.

A summary of representative noise levels associated with typical solar facility construction equipment is provided in Table 12. Typical noise levels are provided at distances of 50, 300, and 1,000 feet.

Table 12: Construction Equipment Noise Levels

Equipment	Noise Level at 50 feet from Source (dBA Lmax)	Noise Level at 300 feet from Source (dBA Lmax)	Noise Level at 1,000 feet from Source (dBA Lmax)
Bulldozer	85	69	59
Crane	85	69	59
Impact Pile Driver[1]	84	68	58
Grader	85	69	59
Haul/Dump Truck	84	68	58
Backhoe	80	64	54

Source: Federal Highway Administration Roadway Construction Noise Model (RCNM) User's Guide. January 2006.

[1] The sound level in the table represents typical pile drivers used for solar array post installation rather than the Federal Highway Administration RCNM pile driver noise data, which generate less noise than the pile drivers used for heavy infrastructure construction.

Operations

Castle Rock Solar conducted sound analyses to evaluate operational compliance of the Project with the Minnesota Pollution Control Agency noise regulations. An operational noise model was developed and utilized to estimate the noise levels generated by Project equipment, including noise from the proposed solar array inverter stations and the Project substation transformer, for both the "Preferred" and "Alternate" layouts. The solar array inverter stations and Project substation transformer are the two loudest operational components which is why they were used for the operational noise model. The panel rotation and tracking motors operate for 10-20 seconds at a time, several times per hour to rotate the panels when tracking the sun. The sound levels from the tracking motors are minimal and are not expected to impact nearby residences which is why they were not included in the operational noise model. The maximum Project-generated noise level at residences and other sensitive receptors was estimated to be equivalent to a continuous sound level (Leq) of 57 dBA during daytime and 37 dBA during nighttime for the Preferred layout, and 57 dBA during daytime and 35 dBA during nighttime for the Alternate layout. The noise modeling results demonstrate that expected daytime and nighttime noise levels at the identified receptor locations are below MPCA limits and that the Project is expected to operate in compliance with the MPCA noise regulations. The Pre-Construction Sound Report conducted for the Project included in Appendix I of this application.

5.2.5 RADIO AND TELEVISION INTERFERENCE

The Applicant has identified radio, television, and cell phone towers located within the vicinity of Project. The results of this review and a discussion of potential impacts to these services from operation of the Project are presented below.

5.2.5.1 Radio & Television

The exclusion distance for amplitude modulation (AM) broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the

lesser of 10 wavelengths or 1.9 miles (3 kilometers). For non-directional antennas, the exclusion distance is simply equal to 1 wavelength. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from an object that may potentially cause interference. Most facilities do not typically cause interference with frequency modulation (FM) broadcast stations.

Multipath interference to a television receiver occurs when television signals are scattered by reflecting off an object such as rotating wind turbine blades. Modern digital television (TV) receivers have undergone significant improvements to mitigate the effects of signal scattering. When used in combination with a directional antenna, it becomes even less likely that such signal scattering will cause interference to digital TV reception.

A three-mile radius around the Project Area was reviewed for AM and FM radio stations, and TV stations (Federal Communications Commission [FCC], 2024). Since no AM, FM, or television stations were found within three miles of the Project, no impacts are expected.

There are numerous AM and FM radio stations, listed in Table 13, that can be heard in the vicinity of the Project. These stations are located in Newport, Minneapolis, Saint Peter, Saint Paul, Rochester, Golden Valley, Northfield, New Prague, Faribault, Edina, Lakeville, Coon Rapids, Blooming Prairie, Richfield, Fridley, Saint Louis Park, Eden Prairie, Red Wing, Elko, Anoka, New Ulm, Richfield, Maplewood, Waseca, Mankato, New Prague, Owatonna, Golden Valley, and Hastings in Minnesota and River Falls, La Crosse, and Hudson in Wisconsin.

Table 13: Radio Stations with Broadcast Area in Vicinity of Project

AM Radio Stations	FM Radio Stations
WKTY (580 AM)	WAJC (88.1 FM)
WREY (630 AM)	KBEM (88.5 FM)
KFXN (690 AM)	KCMP (89.3 FM)
WDGY (740 AM)	KMOJ (89.9 FM)
KUOM (770 AM)	KFAI (90.3 FM)
WCCO (830 AM)	KNGA (90.5 FM)
KNUJ (860 AM)	KNOW (91.1 FM)
KTIS (900 AM)	KZSE (91.7 FM)
KDHL (920 AM)	KQRS (92.5 FM)
KTNF (950 AM)	KXXR (93.7 FM)
KKMS (980 AM)	KSTP (94.5 FM)
WCTS (1030 AM)	K236CO (95.1 FM)
KYMN (1080 AM)	KNOF (95.3 FM)

AM Radio Stations	FM Radio Stations
KTLK (1130 AM)	KCHK (95.5)
KFOW (1170 AM)	KQCL (95.9 FM)
KFSP (1230 AM)	KMWA (96.3 FM)
WWTC (1280 AM)	KTCZ (97.1 FM)
WLOL (1330 AM)	KNXR (97.5 FM)
KCHK (1350 AM)	KEFE (97.9 FM)
KRFO (1390 AM)	KTIS (98.5 FM)
KMNV (1400 AM)	KSJN (99.5 FM)
KTOE (1420 AM)	K260BA (99.9 FM)
KYCR (1440 AM)	KFXN (100.3 FM)
KDWA (1460 AM)	KOWZ (100.9 FM)
KSTP (1500 AM)	KDWB (101.3 FM)
KOLM (1520 AM)	KRCH (101.7 FM)
KDIZ (1570 AM)	KEEY (102.1 FM)
	K273BH (102.4 FM)
	KMNB (102.9FM)
	KZJK (104.1FM)
	WWWM (105.7 FM)
	KWNG (105.9 FM)
	WEVR (106.3 FM)
	K293BA (106.5 FM)
	KTMY (107.1 FM)
	KBGY (107.5 FM)
	KQQL (107.9 FM)

There are approximately 102 digital TV channels broadcast in the vicinity of the Project (Channel Master, 2024). These channels would be received from the city of Minneapolis, Minnesota.

The maximum height of the solar panels when positioned at their highest apex will be 9 to 12 feet. However, final design may include panels that have a maximum height of 18 feet. The perimeter security fence and substation fence will be up to 8 feet high. The facilities developed for the Project are consistent with the height of existing development in the Project Area and are not anticipated to impact any radio or television

services. After commercial operation, any interference reports will be investigated. Any reports determined to be caused by the installation of panels will be mitigated so as to provide the same level of coverage prior to the installation of the Project.

5.2.5.2 Cellular Phone

A three-mile radius around the Project Area was also reviewed for registered antenna structures (towers) (FCC, 2024). No towers are located within the Project Area. The closest tower is approximately 0.04 mile from the Project Area and is 265 feet tall (Appendix B, Map 5). One tower is located about 1.85 miles southwest of the Project Area and is approximately 129 feet tall. A tower is located 2.14 miles northwest of the Project Area and is 343 feet tall and another tower is located 2.19 miles south of the Project Area and is 320 feet tall. At these distances and based on the maximum height of the solar panels at 9 to 12 feet, or the potential final design height of 18 feet, the perimeter security fence and substation fence at up to 8 feet high, the potential aerially spanned collection line poles at 110 feet, and the gen-tie line poles similar in height to existing infrastructure, impacts on cellular services for these towers is not anticipated.

5.2.5.3 Global Positioning System (GPS)

Doppler radar is a specialized radar that uses the Doppler effect to produce velocity data about objects at a distance. It does this by bouncing a microwave signal off a desired target and analyzing how the object's motion has altered the frequency of the returned signal. This variation gives direct and highly accurate measurements of the radial component of a target's velocity relative to the radar. Doppler radars are used in applications such as aviation, sounding satellites, and weather. Tall structures such as trees or buildings within the sight line of the sending position may result in radar interference.

The maximum height of the solar panels may be up to 18 feet and the perimeter security fence and substation fence will be up to 8 feet high. Because the radar towers are elevated to avoid interference from topography (minimum height of the NEXRAD towers is 32.8 feet), it is not anticipated that there would be any impact to radar services due to the development of the Project.

Impacts and Mitigation

Due to the low height of the proposed infrastructure for the Project, no impacts to radio, television, or other communication signals are expected. The structures supporting the short gen-tie line and potential aerially spanned collection lines are expected to be similar in height to existing infrastructure already located in the vicinity of the site, including the Chub Lake-Hampton Corners 345 kV transmission line. Accordingly, the Project is not expected to result in a large change to existing conditions. Since no radio or television stations are located within three miles of the Project, no impacts are expected from either the gen-tie line, collection lines, or the temporary potential use of a crane during construction. Therefore, no mitigation is proposed.

5.2.6 AESTHETICS

Land cover in the Project Area consists primarily of agricultural land with some wetlands, streams, and forested areas. Corn and soybeans are the main crops grown within the Project Area. The topography is gently rolling with few to no steep slopes. Elevation ranges from 870 feet above mean sea level (amsl) to 980 feet amsl.

The views in the vicinity of the Project are varied, with a patchwork of forest, wetlands, streams, rivers, agricultural fields, and pastures, along with scattered rural residences and farm buildings. Many residences are located within forests or are otherwise surrounded by trees.

Xcel Energy's Chub Lake to Hampton Corners 345 kV transmission line runs along 230th St. W. and crosses through the central portion of Project Area and is the planned POI for the Project (Appendix B, Map 7). There are three wind turbine locations located within ten miles of the Project, though all three are sites consisting of one or two turbines (Table 14). There are no large-scale wind farms located near the Project.

Table 14: Proximity of Existing Wind Farms to Solar Project

Project Name	Number of Turbines	County	Distance from Solar Facility (miles)
Eolos	1	Dakota	7.1
Carleton College	2	Rice	9.2
St. Olaf College	1	Rice	10.3

There are no residences located within the Development Area. There are five residences (R-008, R-031, R-033, R-036, and R-037) located outside of the fenced solar array but within the Project Area who are participating landowners. There are an additional 149 residences located on land parcels adjacent to or near the Project Area. Table 15 provides the distances between the nearby residences and Project components, including the Development Area, Solar Array, and Inverters. Participating landowners are identified with an asterisk in Table 15. The distance to Project components is provided for both the Preferred Design and the Alternate Design; the distance to the fenced Development Area is the same for both layout options. Residence locations are shown in Appendix B, Maps 3 and 4.

Table 15: Proximity of Residences to Solar Project

Residence	Distance to Development Area (feet)	Distance to Solar Arrays (feet)		Distance to Nearest Inverter (feet)	
		Preferred Design	Alternate Design	Preferred Design	Alternate Design
R-001	903	940	940	1892	1892
R-002	329	355	355	1309	1309
R-003	2008	2040	2040	3241	3241
R-004	337	367	367	1579	1579
R-005	1863	1911	1911	3062	3062
R-007	895	959	959	1302	1302
R-008*	326	350	350	1277	1277
R-009	324	478	478	1323	1323
R-010	323	360	360	1013	1013

Residence	Distance to Development Area (feet)	Distance to Solar Arrays (feet)		Distance to Nearest Inverter (feet)	
		Preferred Design	Alternate Design	Preferred Design	Alternate Design
R-011	628	690	690	1721	1721
R-012	329	367	367	999	999
R-013	342	368	368	1170	1170
R-014	315	353	353	879	879
R-015	328	356	356	966	966
R-016	321	350	350	988	988
R-017	322	353	353	1021	1021
R-018	333	381	381	1347	1417
R-019	578	602	602	1666	1709
R-020	486	511	511	1605	1575
R-021	432	461	461	1077	1077
R-022	338	367	367	1123	1057
R-023	327	364	364	1114	1114
R-024	445	481	481	1172	1172
R-025	344	410	410	1285	1285
R-026	1409	1434	1434	2298	2298
R-027	744	783	783	1847	1847
R-028	606	809	809	1688	1688
R-029	369	423	423	993	993
R-030	366	421	421	1020	1020
R-031*	325	348	348	832	832
R-032	329	352	352	728	728
R-033	532	587	587	1383	1383
R-034	454	516	516	1014	1014
R-035	693	757	757	1591	1591
R-036*	323	358	358	1145	1145
R-037*	317	353	353	1125	1125
R-038	329	362	362	778	778
R-039	697	749	749	1340	1340

Residence	Distance to Development Area (feet)	Distance to Solar Arrays (feet)		Distance to Nearest Inverter (feet)	
		Preferred Design	Alternate Design	Preferred Design	Alternate Design
R-040	339	383	383	1099	1099
R-041	387	426	426	1205	1205
R-042	515	572	572	1476	1476
R-043	331	359	359	1305	1305
R-044	315	349	349	1395	1395
R-045	364	437	437	1405	1405
R-046	325	380	380	1377	1377
R-047	346	425	425	1405	1405
R-048	318	341	341	1331	1331
R-049	1006	1026	1026	2188	2192
R-050	932	954	954	2130	2129
R-051	337	368	368	1388	1388
R-052	331	370	370	1507	1507
R-053	326	351	351	1180	1180
R-054	1261	1303	1303	2166	2166
R-056	730	780	780	1581	1581
R-057	515	562	562	1365	1365
R-062	343	369	369	881	881
R-064	405	440	440	1224	1224
R-065	632	684	684	1602	1602
R-068	646	714	714	1551	1551
R-070	795	883	883	1897	1897
R-071	526	570	570	1248	1248
R-072	835	859	859	1195	1195
R-074	2295	2338	2338	2738	2738
R-075	2331	2383	2383	2840	2840
R-077	2020	2088	2088	2841	2841
R-079	2284	2353	2353	3082	3082
R-080	2085	2161	2161	2720	2720

Residence	Distance to Development Area (feet)	Distance to Solar Arrays (feet)		Distance to Nearest Inverter (feet)	
		Preferred Design	Alternate Design	Preferred Design	Alternate Design
R-081	1239	1281	1281	2088	2088
R-082	1386	1450	1450	2566	2566
R-084	988	1011	1011	2157	2157
R-085	1201	1231	1231	2612	2612
R-086	1502	1537	1537	2181	2181
R-087	1506	1539	1539	2189	2189
R-088	1795	1831	1831	2481	2481
R-089	1617	1647	1647	2349	2349
R-090	2223	2259	2259	2912	2912
R-091	2353	2395	2395	3157	3157
R-092	1778	1801	1801	2811	2811
R-093	2180	2218	2218	3174	2715
R-094	1930	1956	1956	3119	2711
R-095	2263	2289	2289	3451	2997
R-096	2546	2569	2569	3748	3388
R-097	2539	2565	2565	3728	3264
R-098	2462	2482	2482	3644	3481
R-099	2056	2075	2075	3237	3184
R-100	1705	1728	1728	2912	2641
R-101	1661	1681	1681	2843	2839
R-102	1808	1834	1834	2996	2987
R-103	2214	2266	2266	3396	3396
R-104	2381	2427	2427	3553	3553
R-105	1928	1969	1969	3106	3106
R-106	1543	1569	1569	2733	2381
R-107	1467	1491	1491	2676	2444
R-108	1369	1395	1395	2559	2233
R-109	1050	1074	1074	2250	2054
R-110	1239	1269	1269	2430	2419

Residence	Distance to Development Area (feet)	Distance to Solar Arrays (feet)		Distance to Nearest Inverter (feet)	
		Preferred Design	Alternate Design	Preferred Design	Alternate Design
R-111	1429	1449	1449	2611	2617
R-112	1426	1478	1478	2602	2602
R-113	1146	1197	1197	2321	2321
R-114	668	720	720	1844	1844
R-115	770	820	820	1962	1962
R-116	1162	1212	1212	2353	2353
R-117	582	661	661	1636	1636
R-118	829	893	893	1883	1883
R-119	650	723	723	1687	1687
R-120	849	920	920	1892	1892
R-121	932	1006	1006	1981	1981
R-122	914	993	993	1967	1967
R-123	1062	1134	1134	2098	2098
R-124	1080	1160	1160	2129	2129
R-125	1248	1324	1324	2318	2318
R-126	1146	1215	1215	2206	2206
R-127	1542	1622	1622	2588	2588
R-128	1675	1752	1752	2737	2737
R-129	1549	1623	1623	2615	2615
R-130	1334	1406	1406	2370	2370
R-131	1643	1715	1715	2681	2681
R-132	1699	1768	1768	2752	2752
R-133	1367	1436	1436	2424	2424
R-134	1518	1586	1586	2579	2579
R-135	1822	1889	1889	2867	2867
R-136	1941	2017	2017	3007	3007
R-137	1970	2044	2044	3011	3011
R-138	2069	2146	2146	3117	3117
R-139	2321	2387	2387	3369	3369

Residence	Distance to Development Area (feet)	Distance to Solar Arrays (feet)		Distance to Nearest Inverter (feet)	
		Preferred Design	Alternate Design	Preferred Design	Alternate Design
R-140	2043	2114	2114	3081	3081
R-141	2186	2258	2258	3222	3222
R-142	2377	2450	2450	3423	3423
R-143	2484	2558	2558	3537	3537
R-144	2601	2642	2642	3656	3656
R-145	2645	2718	2718	3694	3694
R-146	2575	2635	2635	3596	3596
R-147	2460	2509	2509	3447	3447
R-148	2312	2371	2371	3331	3331
R-149	2508	2567	2567	3478	3478
R-150	2071	2129	2129	3089	3089
R-151	1952	1997	1997	2930	2930
R-152	1878	1935	1935	2893	2893
R-153	1627	1675	1675	2617	2617
R-154	1770	1829	1829	2741	2741
R-155	1574	1631	1631	2537	2537
R-156	1390	1440	1440	2368	2368
R-157	1292	1349	1349	2247	2247
R-158	1147	1201	1201	2124	2124
R-159	1022	1079	1079	1979	1979
R-160	940	982	982	1923	1923
R-161	775	832	832	1740	1740
R-162	713	761	761	1717	1717
R-163	1811	1847	1847	2556	2556
R-164	2625	2657	2657	3313	3313
R-165	2743	2775	2775	3425	3425
R-166	741	826	826	1526	1526
R-167	2326	2442	2442	3359	3359
R-168	860	959	959	1953	1953

**Residences of participating landowners are identified in the table with an asterisk.*

Impacts and Mitigation

The addition of solar facilities in a rural environment can change the aesthetics of the landscape from an agrarian landscape to a more developed landscape. Some people view this alteration of the landscape as an undesirable disruption to the existing agricultural landscape. However, others recognize that the Project can still incorporate certain agricultural uses, including pollinator habitats to support bees and native pollinators, potential grazing habitat, as well as storing carbon in the soil and building soil health. Consequently, responses to a change in landscape aesthetics are based on personal values and preference.

Approximately 934 acres, mostly agricultural land, will be converted to solar panels, access roads, and a substation. Landscape views and area aesthetics will change as a result of the Project, though the reception of the change in aesthetics is based on personal preference and values. A large portion of the Project Area is surrounded by agricultural land, and the array will be visible from several local roads near the Project. Many of the adjacent and nearby residences have existing vegetative screening surrounding their residences which will block views of the solar panels and Project components. In addition, vegetative screening will be voluntarily added between the Project and residences in several areas to block views of the Project from residences. Renderings of how the Project will look on the landscape are shown in the photos below. Additionally, the Project is located near the City of Farmington and on the edge of the Twin Cities metropolitan area in an area where new development is occurring; development of solar facilities may be preferrable to an alternative site use such as large industrial buildings or new housing developments.

Castle Rock Solar has met with nearby residents to discuss the proposed Project design and incorporated their preferences within the design of the array footprint, Project substation location, perimeter fencing and gates, and use of existing internal site access roads for the purpose of construction, operation, and maintenance of the Project. A security fence will be added around the perimeter of the Project which will be a slight visual change. Access roads will be added to provide access to the solar arrays and other Project components. However, the roads will not greatly alter site aesthetics. Solar panels have an antireflective coating which greatly reduces glare and glint from the panels. Solar panels are relatively low to the ground and, based on the current design, will have a maximum height of approximately 9-12 feet, or the potential final design height of 18 feet.

A short segment of transmission line will connect the Project substation with the existing Chub Lake-Hampton Corners 345 kV transmission line. This gen-tie line (shown in Maps 4a and 4b) is similar in size to the existing transmission line which bisects the Project Area.

The preferred method for the collection line crossing the Vermillion River South Branch is an underground collection line that would be bored underneath the river and the associated wetland. A possible alternative method for crossing that could be used is an aerial collection line crossing; the supporting pole structures for the crossing would be located outside of the river and associated wetland. If this method was utilized, it would result in a visual change over the river corridor for surrounding residences and vehicle traffic on 230th Street W and Biscayne Avenue. However, the section of the Vermillion River South Branch located within the Project Area consists of a very narrow open water channel, which becomes indistinct at points, and is surrounded by a low-quality wetland dominated by reed canary grass. The river does not contain a channel

wide enough to support watercraft, as a result, the river likely supports little to no recreational activity, minimizing the impacts a visual change over the river would have (see Figure 8).

Snowmobile Trail 123 currently runs through the northern portion of the site. During the winter, there may be significant visual changes along the rerouted section of the snowmobile trail that will replace the trail currently running through the site, depending on how the trail is rerouted. In addition, the western portion of the solar arrays may be visible from the southern end of the Fountain Valley Golf Course.

Overall, visual impacts from the Project are expected to be limited to areas near the Project and vegetative screening has been targeted to provide screening between nearby residences and the Project. If requested, Castle Rock Solar will work with adjacent landowners regarding the planting of vegetative screening. The greatest visual changes will be from adjacent roadways, some adjacent residences, the reroute of snowmobile trail 123, and potentially the southern portion of the golf course. However, the golf course is the subject of a current rezoning effort to commercial industrial for use as a data center. Given that the solar panels have a low profile, the impact of aesthetic changes due to the Project are anticipated to be limited to areas near the Project. View 1 shows the view under existing conditions and View 2a simulates the view with the Project facilities for nearby residents near the intersection of 225th Street West and Beaumont Avenue. View 2b simulates the view with the Project facilities for nearby residents near the intersection of 225th Street West and Beaumont Avenue with vegetative screening established along the Project fence line. Landscape screening has been planned for this location to buffer views of the Project where the solar facility is adjacent to residential development. Views 3 and 4 show the Project Area from travelers on 220th Street East between Ahern Boulevard and Blaine Avenue under the existing conditions and with the proposed Project, respectively. View 5 and 6 shows the view from 240th Street West and Biscayne Avenue West under the existing conditions and proposed Project, respectively. These views show a transition from cultivated cropland to solar facility with permanent perennial vegetative cover.

View 1. Project Area existing conditions facing south from near the intersection of 225th Street West and Beaumont Avenue.

View 2a. Project Area with proposed solar facility facing south from near the intersection of 225th Street West and Beaumont Avenue.

View 2b. Project Area with proposed solar facility incorporating vegetative screening facing south from near the intersection of 225th Street West and Beaumont Avenue.

View 3. Project Area existing conditions facing south from 220th Street East between Ahern Boulevard and Blaine Avenue.

View 4. Project Area with proposed solar facility facing south from 220th Street East between Ahern Boulevard and Blaine Avenue.

View 5. Project Area existing conditions facing northeast from the intersection of 240th Street West and Biscayne Avenue West.

View 6. Project Area with proposed solar facility facing northeast from the intersection of 240th Street West and Biscayne Avenue West.

5.2.7 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The U.S. Census Bureau's 2021 American Community Survey 5-Year Estimates (U.S. Census Bureau 2021) was utilized to collect socioeconomic information about the Project Area and the surrounding areas. Information is provided at the county and township levels to adequately identify small concentrations of minority populations and low-income populations.

Environmental Justice

The MPCA defines environmental justice (EJ) as the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, concerning the development, implementation, and enforcement of environmental laws, regulations, and polices (MPCA 2023a). The MPCA has developed an online data and mapping tool using U.S. Census tract data to assist in ensuring pollution does not have a disproportionate effect on any group of people (MPCA 2023b). Under Minn. Stat. 216B.1691, subd. 1(e),[10] a census tract is considered an environmental justice area if any of the following parameters are met: more than 35 percent of the households have a household income at or below 200 percent of the federal poverty level; 40 percent or more of the area's total population is nonwhite; 40 percent or more of the area's residents over the age of five have limited English proficiency; or the area is within Indian Country, as defined in United State Code, title 18, section 1151. According to the MPCA mapping tool, the Project Area

[10] Although this statute is not directly applicable to a site permit or route permit proceeding, the Applicant addresses this definition in this Application because it is the only place in statutes applicable to the Commission where environmental justice area is defined.

is not within an area of concern and the closest area of concern is approximately five miles south of the Project Area in census tract 9504.02.

Population and Race

Table 16 below details the 2021 population and race characteristics of residents in Castle Rock Township and Dakota County overall. Dakota County had an estimated population of 435,863 and Castle Rock Township had an estimated population of 1,563. Castle Rock Township makes up a very small proportion (0.36 percent) of the overall population of Dakota County. Dakota County has a higher median age at 38.1 compared to 33.8 for Castle Rock Township.

The predominant race in Dakota County as a whole and Castle Rock Township individually is White (alone, not Hispanic or Latino). Less than 13 percent of the population of Dakota County is composed of residents that identify as either Two or More Races or of Hispanic or Latino Origin (of any race) while Castle Rock has less than five percent. Dakota County has a population density of approximately 775.6 residents per square mile while Castle Rock Township's is approximately 43.6 residents per square mile.

Table 16: Population and Race Characteristics

Category[1]	Castle Rock Township	Dakota County
Total Population	1,563	435,863
Median Age	33.8	38.1
Population Density (per square mile)	43.6	775.6
Race and Hispanic or Latino Origin		
One Race (%)	98.1	94.6
White (%)	96.4	79.5
Black or African American (%)	0.0	6.8
American Indian or Alaska Native (%)	0.0	0.2
Asian (%)	0.1	5.1
Native Hawaiian/Pacific Islander (%)	0.0	0.0
Some Other Race (%)	1.7	2.9
Two or More Races (%)	1.9	5.4
Hispanic or Latino Origin (of any race) (%)	2.9	7.5
White Alone, not Hispanic or Latino (%)	95.6	76.4

[1] Data retrieved from the 2021: ACS 5-Year Estimates Subject Table, Selected Characteristics of the Total and Native Populations, Table ID: S0601.

Housing

Table 17 below details the 2021 housing characteristics for Castle Rock Township and Dakota County overall.

Table 17: Housing Characteristics

County/Township/City	Category [1]		
	Total Housing Units	Occupied	Vacant
Dakota County	175,992	170,696	5,296
Castle Rock Township	528	504	24

[1] Data retrieved from the 2021: ACS 5-Year Estimates Subject Table, Selected Housing Characteristics, Table ID: DP04

Income and Poverty

Table 18 details the 2022 income and poverty characteristics of Castle Rock Township and Dakota County overall. Dakota County's top three industries for employment were classified as Education Services, and Health Care, and Social Assistance (22.3%), Professional, Scientific, and Management, and Administrative and Waste Management Services (12.5%), and Retail Trade (11.3%). Castle Rock Township's top three industries were classified as Education Services, and Health Care, and Social Assistance (18.7%), Construction (15.2%), and Manufacturing (14.4%). Education Services, and Health Care, and Social Assistance was the only industry category that was identified as a top industry in both the township and the county.

Table 18: Income and Poverty

County/Township/City	Category[1]		
	Per Capita Income	Unemployment Rate (Civilian over 16 years)	Residents With Income in the Last 12 Months Below the Poverty Level
Dakota County	$48,894	3.7%	5.6%
Castle Rock Township	$44,597	4.1%	0.9%

[1] Data retrieved from the 2022: ACS 5-Year Estimates Subject Table, Selected Economic Characteristics, Table ID: DP03.

Impacts and Mitigation

No measures to mitigate socioeconomic or EJ impacts are needed because the Project is expected to produce an overall positive socioeconomic benefit to the community and surrounding areas and does not meet the criteria for an environmental justice area.

The Project is designed to be beneficial to the landowners, local governments, and communities. Economic benefits include financial benefits to participating landowners as they execute voluntary lease, purchase, or easement agreements with Castle Rock Solar. The local and surrounding communities will benefit from increased demand for lodging, food services, fuel, transportation, construction materials, and other general supplies during the construction phase of the Project.

Castle Rock Solar's request for proposal process will include preferences for BOP[11] contractor bids that include the utilization of local craft workers and is expected to require 200-375 construction workers. The Project will consider all appropriate options for hiring labor, with a focus on meeting prevailing wage requirements of the IRA. To the extent practicable with the Project's timelines, budget, and safety standards, Castle Rock Solar will select a BOP contractor that will consider local craft workers, local subcontractors, and local venders during the construction phase of the Project to maximize local economic benefits. Due to the majority of the assembly and wiring configurations necessary for Project construction falling under the Minnesota State Electrical Code, it may not be practicable to fill certain positions locally that require Minnesota licensed electricians or other personnel with specialized training. Job opportunities that may be created during and after the construction of the Project include general skilled and specialized labor positions, equipment operators, and licensed electricians for the relatively short-term construction phase and then long-term positions including skilled labor to operate and maintain the Project, snow plowing, and access road/landscape maintenance.

Temporary or permanent housing impacts due to the Project's construction and long-term operation is expected to be minimal. Out-of-town construction crews will likely use local lodging facilities in Dakota County and/or Scott County. In 2022, Dakota County had an estimated 4,760 vacant housing units and Scott County had approximately 1,897 vacant housing units (US Census Bureau 2022). Approximately one full-time O&M manager, and anywhere between two to six solar technicians are expected to be required for the long-term operation and maintenance of the Project. Out-of-town construction crews will likely use local lodging facilities in Dakota County and/or Scott County. Based on the local lodging facilities located along I-35 and the availability of vacant housing units in Dakota County and neighboring counties, it is anticipated that temporary and permanent housing needs during and after construction will be sufficient for the Project.

Loss of income from agricultural production on the land will be mitigated through voluntary lease, purchase, and/or easement agreements with landowners.

In general, the socioeconomic impacts associated with the Project will be positive; therefore, no mitigative measures are proposed. Wages will be paid, and expenditures will be made to local businesses and landowners during the Project's construction and operation. The Project is anticipated to provide approximately $185,000 to $310,00 in production tax revenue to Dakota County, and $46,000 to $76,000 to the township annually, depending on final design. The local labor force may expect to benefit from short and long-term job opportunities and local businesses can expect an influx in profits especially during the construction phase of the Project.

5.2.8 CULTURAL VALUES

Cultural values include the shared beliefs, practices, and ways of life among a group of people in a given community. Dakota County, before European settlement, was part of the once large territory of the Dakota tribes of indigenous people. By approximately the 1850s, large numbers of European settlers began calling the area home (Dakota County Historical Society 2016-2023). Today, according to the U.S. Census Bureau

[11] BOP contractor refers to persons other than the supplier with whom the buyer contracts or subcontract to perform the work.

2022 Census Results, Dakota County consists primarily of individuals of European descent (approximately 75.6 percent). This was followed by Black or African American (8.3 percent), Hispanic or Latino (7.8 percent), Asian American (5.5 percent), those identifying as two or more races (3.2 percent), American Indian and Alaska Native (0.7 percent), and Native Hawaiian and Other Pacific Islander (0.1 percent) (U.S Census Bureau 2022).

The northwestern third of Dakota County is largely centered around non-agricultural business, but the remainder of the county, including the location of the Project Area, has an economy largely based on agriculture (Dakota County Geographic Information System undated). Common recreational activities within the area seem to largely revolve around seasonal outdoor activities around natural areas, including fishing, hiking, kayaking, and snowshoeing in areas such as Lebanon Hills Regional Park, the Mississippi and Minnesota Rivers, and numerous lakes (Dakota County 2022). Additional information on recreation is available in Section 5.2.9. The Dakota County fairgrounds, which hosts the counties annual fair every summer, is located just one mile west of the Project Area (Dakota County Geographic Information System undated). Additional gatherings center around changes in the season, including a celebration of winter entitled “Fiesta en la Nieve” geared towards Spanish speakers (Dakota County 2023).

The Castle Rock Township Comprehensive Plan Executive Summary goals and policies includes environmental resource goals which states that the township seeks to promote solar access and sustainable energy alternatives for residents and businesses. Castle Rock zoning ordinance No. 2023-02 governs solar electric systems in the township as further described in Section 5.2.11. According to the zoning ordinance, wholesale solar electric systems are allowed in the RR-1 Rural Residential District and AG Agriculture Districts. Castle Rock Solar has worked to adhere to the zoning ordinance wholesale solar electric system setbacks to roadways, property lines, and residential dwellings, and lighting and signage requirements for the site.

The City of Farmington 2040 Comprehensive Plan, dated December 2019, includes strategies for solar. Goal 5 of the plan includes the goal of increased use of renewable energy. Policy 5.1 of the plan protects solar access in new developments and subdivisions to enable potential development of solar energy systems. Policy 5.2 of the plan encourages businesses and residents to participate in renewable energy programs or install renewable energy systems. The plan also includes an analysis of solar resources. This analysis does not include ground-mount systems, but the plan states that the city should consider criteria for potential future locations of ground-mounted solar fields, such as commercial parking lots, public rights of way, and future development sites.

Impacts and Mitigation

The Project will not permanently impact the general character, aesthetics, or cultural values of the Project Area. Construction and operation of the Project would not impact public participation in the regional community cultural events noted above, as the Project Area is located outside of municipal areas. Therefore, no impacts to cultural values are anticipated, and no mitigative measures specific to cultural values are proposed. Castle Rock Solar has worked to engineer and design the project to conform to local zoning ordinances. A vegetation management plan and landscape plan have been developed for the Project that includes native perennial vegetation and buffers to screen views of the project from residential locations. The Project is not expected to create glare on other property or public roadways. Further

discussion of the Project's potential impacts on aesthetics of the local landscape is provided in Section 5.2.6. The Project will also adhere to Minnesota Pollution Control Agency noise regulations as described in Section 5.2.4.

5.2.9 RECREATION

There is large agricultural presence within the rural portion of Dakota County, including much of the Project Area. However, there are recreational opportunities available in the area, including in the nearby City of Farmington. Castle Rock Township is located on the fringe of the Twin Cities metro area, making it easy to access attractions and recreational opportunities in the Twin Cities. Dakota County offers many recreational activities including hiking, ATV, canoeing, kayaking, fishing, cross-country skiing, and snowmobile trails.

There are three Farmington city parks, as well as multi-use paved trails and sidewalks located within one mile of the Project (Table 19; Appendix B, Map 8). The Dakota County Fairgrounds are located one mile west of the Project. According to the MNDNR ParkFinder map, there are no state parks, trails, or boat launches located within one mile of the Project (Appendix B, Map 8). Hampton Woods Wildlife Management Area (WMA) is located 0.75 mile east of the Project. According to the MNDNR Interactive Snowmobile Trail map, Dakota County Snowmobile Trail 123 runs northeast-southwest through the portion of the Project located between MN State Highway 50 (220th St. W.) and 230th St. W. (MNDNR 2024b). The Fountain Valley Golf Course is located 0.1 mile northwest of the Project; the course is privately owned, but open to the public[12]. The Vermillion River South Branch does cross through the Project Area. However, the portion of the river located in the Project Area has a very narrow open water channel which becomes indistinct at times and is not large enough to support recreational watercraft.

Table 19: Recreational Resources

Resource	Approximate Distance to Solar Facility Boundary
Dakota County Snowmobile Trail 123	Crosses through the portion of the Project Area located between CR 50 (220th St W) and 230th St W
Hampton Woods WMA	0.75 mile east of Project
Prairie View Park (City of Farmington)	0.90 mile northwest of Project
Prairie Waterway Greenway (City of Farmington)	0.75 mile northwest of Project
Prairie Pines Park (City of Farmington)	0.60 mile northwest of Project
Multi-use paved trails and sidewalks (City of Farmington)	0.60 mile northwest of Project
Dakota County Fairgrounds	1 mile west of Project
Fountain Valley Golf Club	0.1 mile northwest of Project

Impacts and Mitigation

[12] The Fountain Valley Golf Club is the subject of a current rezoning effort to commercial industrial for use as a data center.

The Project will not impact access to public land. The snowmobile trails which currently run through the Project will need to be rerouted outside the Project fence, as they currently cross through the main solar array and within the fenced facility area. Castle Rock Solar will work with the Dakota County Trail Association to reroute the snowmobile trails. The Project will create an aesthetic visual landscape change and solar panels from the western side of the Project may be visible from the southern portion of the golf course, which may be redeveloped to a data center in the near future. The southeastern portion of the golf course has existing mature vegetative screening in place that would buffer views of the Project from the golf course.

5.2.10 PUBLIC SERVICES AND INFRASTRUCTURE

5.2.10.1 Police, Fire, and Ambulance Services

Police, fire, and ambulance services are provided by local emergency response agencies located in the area including the Farmington Fire Station, Randolf Fire Department, Dakota County Sheriff, and Allina Health Emergency Medical Services (Dakota County, 2019).

Other emergency response agencies within 10 miles of the Project Area include:

- Lakeville Fire Department
- Farmington Police Department
- Lakeville Police Department
- Rosemount Police Department
- Apple Valley Police Department
- Cannon Falls Ambulance Service
- ALF Ambulance Service

5.2.10.2 Hospitals

Hospitals near the Project include Northfield Hospital, Allina Hastings, United Hospital-Hastings Regina, and Fairview Hospital. Smaller medical clinics in the area include Lakeville Clinic, Apple Valley Clinic, and Allina Savage Health Clinic.

5.2.10.3 Water and Wastewater Services

Water and wastewater services for most rural residences in the area are supplied by domestic wells and private septic systems. Additional information on groundwater and wells near the Project Area is provided in Section 5.6.3.

5.2.10.4 Utilities

There are numerous utility services and providers in Dakota County. Mobile telephone services are provided by New Cingular Wireless, T-Mobile, and Cellco Partnership. The top fixed wireless provider is T-Mobile, and the top cable provider is Comcast Cable Communications Inc. Various other providers also provide DSL, satellite, and fiber services (MN Deed 2023).

Two natural gas or hazardous liquid pipelines were identified in the Project Area, as shown in Appendix B, Map 5 (Pipeline and Hazardous Materials Safety Administration [PHMSA] 2024). One hazardous liquid pipeline runs east and west along 230th Street, then goes northeast to Annettee Ave (Marathon Pipeline). The other pipeline runs north and south on the east side of the Project Area (Magellan Pipeline Company, LLC). One transmission line, Chub Lake-Hampton 345 kV, crosses through the Project Area running east and west along 230th Street, then cuts northeast through the eastern portion of the Project Area as shown in Appendix B, Maps 3 and 5.

Dakota Electric Association and Xcel Energy are the two primary electrical providers for the Project Area (MN Electric Utility Services 2024). Minnesota Energy Resources provides natural gas service in the Project Area (Minnesota Energy Resources 2024).

Impacts and Mitigation

Emergency services are not expected to be temporarily or permanently impacted by the Project. In the event of an emergency in the Project Area, local emergency services will be called, construction will stop, and equipment will be moved to allow emergency vehicle access to the site. Law enforcement resources may be utilized for traffic control and law enforcement during construction activities. No impacts to emergency or public health services are expected with additional construction workers in the area. Once construction is complete, the Project will not impact emergency services. As such, construction and operation of the Project is anticipated to have minimal impacts on the emergency services.

The Applicant will coordinate with Gopher State One Call before and during construction to fully understand infrastructure, utility locations, and safety concerns and to avoid possible structural conflicts. The Applicant will also conduct an American Land Title Association survey to identify the locations of underground utilities. If a conflict cannot be avoided, the Applicant will coordinate with the utility for a solution. If found, underground utilities will be marked prior to the start of construction.

The Solar Facility will interconnect to the existing Xcel Energy Chub Lake to Hampton Corners 345 kV transmission line. Local electric utility customers served by the Chub Lake to Hampton Corners 345 kV transmission line may experience short outages while the transmission line is shut down and interconnection is established. Xcel Energy would coordinate with utilities and landowners and communicate the timing and duration of any service interruptions with their customers. Under both the Preferred and Alternate Project design, a proposed access road that will provide access to the Preferred Project switchyard and substation and four proposed access roads that will provide access to solar array areas from 230th St. W. will cross the Chub Lake to Hampton Corners 345 kV transmission line. The Applicant will coordinate the access road crossing with Xcel Energy. Permanent impacts to public utilities are not anticipated. Therefore, no permanent mitigation measures are proposed.

5.2.11 LAND USE AND ZONING

The Project is located within Castle Rock Township in Dakota County, Minnesota. As noted in Section 1.4.1, the Site Permit will supersede and preempt all zoning, building, or land use rules, regulations, or ordinances put in place by regional, county, local and special purpose governments per Minn. Stat. § 216E.10, subd. 1. However, the Commission will consider potential impacts to local land use.

Castle Rock Township has adopted a Zoning Ordinance as well as Ordinance No. 2023-02 - an Ordinance Amending the Castle Rock Township Zoning Ordinance Regarding Solar Electric Systems (Solar Ordinance). The Castle Rock Township Zoning Ordinance, which governs development within the township, and the Solar Ordinance provide specific requirements for the development of solar energy systems not subject to the Commission's site permit requirement. The Project is primarily located within the Zone District AG – Agricultural District under the Castle Rock Township Zoning Ordinance. The Solar Ordinance specifies requirements for Wholesale Solar Electric Systems and limits them to RR-I Rural Residential Districts and AG – Agriculture Districts with the approval of an Interim Use Permit.

Castle Rock Township also provides protections for SO – Shoreland Overlay District which applies to properties within 300 feet of the shoreline of public waters, including the stream channel of the Vermillion River, Chub Creek, and certain tributaries. The Castle Rock Township SO – Shoreland Overlay District permits the same uses as the permitted uses allowed within the zoning district that underlies the Shoreland District, which is the AG – Agriculture District within the Project. Within the FO – Floodplain Overlay District, Castle Rock Township prohibits all uses and structures which are not specifically permitted; solar electric systems are not listed as a permitted use and are therefore prohibited. One span of collection lines for the Project will either be installed underground via horizontal directional drilling methods or aerially span the SO – Shoreland Overlay and the FO – Floodplain Overlay Districts. Both methods would be conducted from adjacent uplands and would not result in aboveground infrastructure within the prohibited districts. No aboveground infrastructure is proposed within the Shoreland Overlay or Floodplain Overlay Districts as the Project is designed using the appropriate setbacks as detailed in Section 4.2.1. Additionally, the township ordinance states that wherever the Dakota County Shoreland or Floodplain Ordinances differ from the township, the most restrictive specific regulation applies as described below which details Dakota County's shoreland and floodplain permit.

Dakota County has adopted a general Zoning Ordinance and the county regulates the shoreland and floodplain in the unincorporated townships in Dakota County. Under Dakota County Ordinance 50 – Shoreland and Floodplain Management, work occurring within a Shoreland or Floodplain Overlay District requires a county permit. Dakota County Ordinance does not allow utility scale solar energy systems in the Shoreland Overlay District of waterways designated as Tributary, which includes the Vermillion River South Branch. The Vermillion River South Branch is also a designated DNR Public Water which requires a 50-foot vegetated buffer. No aboveground infrastructure, except for a potential overhead collection line, is proposed for the Project within Shoreland and Floodplain Districts and the Project will adhere to all appropriate setbacks as detailed in Section 4.2.1 for the balance of the Project, except for the collection line that must cross the Shoreland and Floodplain Districts.

The Vermillion River Watershed Joint Powers Organization (VRWJPO) requires that when new lots are created by the subdivision of an existing property, vegetated buffers are provided around wetlands and streams. While most of the Project Area will not involve subdividing existing parcels, the Project does incorporate the VRWJPO buffer requirements of the South Branch Vermillion River into its Project design. Buffer requirements include an average buffer of 150 feet and minimum of 100 feet along the South Branch Vermillion River, classified as a conservation corridor by the VRWJPO. There are several streams located within the Project that are classified as tributary connectors by VRWJPO with a buffer designation averaging 50 feet, with a minimum of 35 feet. VRWJPO wetland buffers vary based on wetland quality; exceptional quality wetlands have a buffer averaging 50 feet with a minimum of 30 feet, while low quality wetlands have a buffer averaging 25 feet with a minimum of 16.5 feet (Vermillion 2024).

The Project has incorporated a 50-foot setback to all wetlands with the exception of 0.06 acres of wetland which will be permanently impacted for access road. A total of 6.96 acres of wetlands will be temporarily impacted during construction. As per typical permit conditions established by the USACE for construction within wetlands, Castle Rock Solar will continue to evaluate ground conditions within wetland areas where panels and perimeter fence will be constructed. Castle Rock Solar commits to the use of construction matting, low ground pressure equipment, or completing construction activities during frozen ground conditions as a means to avoid wetland impact from construction equipment. These wetland areas will be restored and revegetated after construction is completed as described in the VMP in Appendix E. Wetland impacts are further discussed in Section 5.6.5.1.

Land use within the Project Area was assessed and reported below based on the NLCD. Land use within the Project Area is primarily cultivated crops, along with herbaceous/hay/pasture and emergent and woody wetlands (Appendix B, Map 9a and 9b, USGS 2021). According to the U.S. Department of Agriculture (USDA) 2022 Census of Agriculture, approximately 208,517 acres of Dakota County are used as cropland. There was a total of 841 farms in Dakota County in 2022 with an average farm size of 248 acres. The Project will be situated on approximately 1,355 acres of predominantly agricultural land. The Development Area for Preferred Project design constitutes approximately 934.2 acres within the proposed fence along with access roads and underground cables located outside the fence. The remaining 420.8 acres will not be developed for the Project and will remain in their current land use of primarily hay/pasture, emergent and woody wetlands, developed land, developed open land, and cultivated crops. The Development Area for the Alternate Project design constitutes approximately 933.5 acres within the proposed fence along with access roads and underground cables located outside the fence. The remaining 421.5 acres will not be developed for the Project and will remain in their current land use of primarily hay/pasture, emergent and woody wetlands, developed land, developed open land, and cultivated crops.

Other land uses present within the Project Area are developed land, open space developed land, shrub/scrub, deciduous forest, mixed forest, and open water. Table 20 summarizes the land use of all land within the Project Area, shown as the red polygon in Appendix B, Map 9a and 9b. This includes land that is outside the Development Area, which is the area within the red polygon not shown with yellow angled lines in Appendix B, Map 9a and 9b. The land use is shown as it is represented in the NLCD dataset, as a result actual land use may differ in some areas from the NLCD.

Table 20: National Land Cover Data Within the Project Area

Land Use Type	Acres in Solar Facility Development Area
Cultivated Crops	1181.49
Deciduous Forest	0.89
Developed, High Intensity	0.22
Developed, Low Intensity	7.92
Developed, Medium Intensity	2.45
Developed, Open Space	25.81
Emergent Herbaceous Wetlands	23.68
Herbaceous/Hay/Pasture	107.11
Mixed Forest	0.14
Open Water	1.78
Shrub/Scrub	0.44
Woody Wetlands	2.95
Total	**1354.90**

Source: USGS National Land Cover Data 2021.
[1]*Note: Table totals may differ slightly from sum of rows as a result of rounding.*

Impacts and Mitigation

The Development Area is the land that will be impacted by the Project. Expected land use impacts to the Development Area for the Preferred and Alternate Project design are shown in Table 21 and Appendix B, Maps 3a, 3b, 9a and 9b. Table 21 does not include land outside of the Development Area, so the total acreage is less than the acreages in Table 20. Land use type is based on USGS NLCD data, as a result actual current land use may differ in some areas from the NLCD. The majority of the Development Area for the Preferred and Alternate Project design is expected to primarily affect land that is currently cultivated crops. The impact on land use between the Preferred and Alternate Designs are very similar and shown in Table 21.

Table 21: Expected Land Use Impacts

Land Use Type	Acres in Development Area – Preferred Design	Percent of Total Acreage – Preferred Design	Acres in Development Area – Alternate Design	Percent of Total Acreage – Alternate Design
Cultivated Crops	919.52	98.42	918.63	98.40
Hay/Pasture	13.98	1.50	13.96	1.50
Developed Low Intensity	0.08	0.01	0.08	0.01
Developed Medium Intensity	0.04	0.004	0.04	0.004
Developed High Intensity	0.002	0.0002	0.002	0.0002
Developed Open Space	0.41	0.04	0.47	0.05
Emergent Herbaceous Wetlands	0.07	0.01	0.07	0.007
Deciduous Forest	0.14	0.02	0.28	0.03
Mixed Forest	0.004	0.0004	0.004	0.0004
Total	**934.24**	**100**	**933.54**	**100**

Source: USGS National Land Cover Data 2021.
[1]*Note: Table totals may differ slightly from sum of rows as a result of rounding.*

As the Project is subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, the Site Permit to be issued by the Commission will serve as approval of the Project. Castle Rock Solar will continue to coordinate with Dakota County and Castle Rock Township on other potential permits for the Project (e.g., road use agreement, driveway permits, utility crossing permits, etc.). Because no permanent zoning impacts are anticipated, no additional mitigation measures are proposed beyond those described below.

The Project has been designed to adhere to the setbacks detailed in the Castle Rock Township Solar Ordinance and the VRWJPO. The solar panels and structures will be located outside of the Floodplain Overlay District and Shoreland Overlay District. The only infrastructure located in the floodplain will be collection lines which are required to connect sections of panels and will be located underground.

The Project will result in impacts to the current land use within the Project Area, as shown in Table 21. The largest change will be in the solar array areas; currently cropped land will be transitioned to native, low-growing perennial herbaceous cover. The transition to native, perennial vegetative cover should reduce the volume of water runoff and improve water quality and soil health. After the Project is decommissioned, the land could be converted back to cultivated crops. The emergent wetlands in the Development Area are currently farmed wetlands. The installation of the solar panels may cause temporary impacts to the wetlands during construction. However, the solar panels are elevated above the ground and the areas will be reseeded with native vegetation, allowing the panels to be present within the emergent wetlands with

minimal impact to the wetlands. Vegetation in the wetlands is generally disturbed and planted with crops, so the change in land use is expected to benefit the wetlands.

The collection lines will be primarily buried underground, with the exception of the crossing of the South Branch Vermillion River, which may include an aerial span. Within the solar arrays cables may be underhung on the tracking racks, then buried underground at the end of the tracking rack and then commence to the inverters within the panel block. Installation of the collection line may have temporary impacts during construction; following installation, the areas will be restored with perennial, herbaceous cover. The large hay/pasture and emergent and woody wetland areas located between the northern and southern portion of the Project Area correspond with the wetlands associated with the Vermillion River South Branch. Collection lines will be bored underneath or spanned over the non-farmed wetlands, avoiding impacts to these resources. Boring collection lines underneath wetlands installs the collection lines well below the surface of the wetland and thus avoids disturbing wetland vegetation, soils, and hydrology contrary to what might occur if the collection lines were installed via an open trench or vibratory plowing. Equipment used for boring the collection lines would remain in adjacent upland areas on either side of the wetland and traffic through the wetland would be reduced to foot traffic only. If the collection lines are aerially spanned across the wetlands, all related aboveground infrastructure would be located in adjacent upland areas on either side of the crossing, therefore, eliminating any potential wetland impacts. Although waterways will be crossed in areas by access roads, existing crossings and field accesses will be prioritized to avoid impacting flow in the ditches. The O&M building will result in the conversion of 0.1 acre of cropland to a building surrounded by a gravel pad with parking for several vehicles. The substation and switchyard will each convert up to 6.0 acres of cropland to a fenced gravel pad with substation and switchyard equipment, respectively.

The wetlands within the Project Area are comprised of a variety of wetland types, however, those located within the Development Area are mostly comprised of non-forested communities, including wet meadow and farmed wetlands. Many of the wetlands in the Development Area have been impacted over time by intensive farming activities and extensive drainage manipulation; these wetlands are generally of lower-quality and dominated by invasive or non-native species. The forested and shrub-scrub wetlands within the Project Area are generally located outside of the Development Area and will not be impacted by the Project. A large portion of existing wetlands present within the Development Area are farmed wetlands and the majority of watercourses are agricultural ditches. Operations of the Project will likely improve these aquatic features by plantings of perennial cover that will reduce soil erosion and other possible pollution from entering public waters like the Vermillion River South Branch, as well as other wetlands in the Project Area.

Driven piers used to support the solar arrays are not anticipated to result in wetland loss under the Minnesota WCA or to constitute wetland fill under Section 404 of the CWA. The piers would not alter the wetland’s cross-section or hydrological characteristics, obstruct flow patterns, notably alter the wetland function and value, change the wetland boundary, or convert the wetland to non-wetland, which is how wetland fill is defined under WCA (Minn. R. 8420.0111, subps. 26 and 32). The wetland type that would be located under the solar arrays would be farmed wetlands, which are currently disturbed by farming practices and whose quality should improve following construction of the solar arrays, as they will be seeded with native vegetation.

5.2.12 TRANSPORTATION

5.2.12.1 Roadways

The Project will be accessed using existing local, county, and state roads (Appendix B, Map 7). No changes to existing roads are planned. Access entrances to the Project Area will be constructed to connect to local and county roads. Proposed access entrances and access roads are shown in Appendix B, Map 3 and Map 7. Roads with proposed access entrances for both the preferred and alternate design include 230th Street West, 230th Street East, Biscayne Avenue, 240th Street West, County Road 78, and County Road 79 (Blaine Avenue).

As a result of the rural location of the Project, traffic volumes on area roads generally range from 60-640 vehicles per day. Minnesota State Highway 50 exhibits the highest volume with an average traffic volume of approximately 3,900 vehicles per day. The Annual Average Daily Traffic (AADT) counts from MNDOT for roadways near the Project Area are shown in Table 22 and Appendix B, Map 7. For roadways which had more than one AADT count, the count closest to the Project is listed in Table 22, the other counts are shown in Map 7.

Table 22: Annual Average Daily Traffic in the Project Vicinity

Roadway	Year	AADT Traffic Volume Total
Solar Facility		
Minnesota State Highway 50	2022	3932
Dakota County Road 78	2018	140
Dakota County Road 79	2022	604

5.2.12.2 Railroads

There are no railroads located within, or within one mile of the Project Area. The closest railroad is the Union Pacific rail line located 1.75 miles west of the Project Area.

5.2.12.3 Airports and Airstrips

According to the FAA, there are no airports or airstrips located within the Project Area. The closest FAA-registered airport is Lucht Field Airport (‘MN46) located approximately 0.02 mile east of the Project Area (Appendix B, Map 7). Lucht Field Airport is a privately owned airport with one approximate 2,006-foot turf runway. Three additional airports were located within five miles of the Project: Nielsen’s (‘MY97), located 0.57 mile southwest; Jennrich Field (‘MN45), located 2.57 miles south; and Hall (‘69MY), located 2.61 miles north (Appendix B, Map 5). Another five airports were located within ten miles of the Project: Airlake (‘LVN), 5.52 miles from Project; Backstrom (‘36MN), 6.11 miles away; Turkey Track (‘MY52), 6.43 miles away; Stanton Airfield (‘SYN), 9.47 miles away; and Northfield Hospital (‘48MN), 9.54 miles away. An additional

nine airports were located within 15 miles of the Project. There are a total of 18 airports located within fifteen miles of the Project Area, the majority of which are private airports.

Impacts and Mitigation

The Project will be accessed using existing local and county roads with no changes to roadways anticipated. During construction of the Project, a temporary increase in local traffic is expected due to vehicles delivering materials and bringing personnel to the site. Construction traffic volume will vary depending on the stage of construction and timing of deliveries. The functional design capacity for a typical two-lane paved rural highway is approximately 5,000 vehicles per day (AADT). Local roadways currently have traffic volumes below the design capacity, allowing for sufficient capacity to handle construction traffic. While local residents may notice temporary increases in traffic at times, it should not impair traffic function of the roadway. Occasionally, slow moving construction vehicles may cause delays on local roads, and impacts will be similar to slow moving farm equipment. Following completion of construction, traffic impacts are expected to be very low and will primarily consist of a small number of maintenance staff using pickup trucks or similar vehicles to monitor and maintain the Project as needed.

During construction, most of the work and transportation activities will occur during low volume and off-peak times. Construction activities will be conducted primarily during daylight hours, during off-peak times Monday through Friday. Signage will be posted during construction to notify local traffic of construction vehicles entering and exiting the roadway and presence of workers.

The first phase of construction will include delivery of earth-moving equipment and aggregate for the solar array access roads. Delivery trucks will bring steel posts, racks and solar modules, followed by equipment and personnel to install them. This will be followed by installation of the electrical system which will be installed by trenching equipment. Smaller vehicles for personnel arriving on-site may continue through later hours if needed to maintain the Project's construction schedule.

Construction traffic will be temporary and is anticipated to commence second or third quarter of 2027 with the bulk of the traffic occurring third quarter 2027 through second quarter 2028 depending upon permit approvals. Construction is scheduled to be completed within approximately fourteen (14) months. Approximately 100 vehicles per day are assumed for construction workers, traveling approximately 30 miles per day per vehicle. The workers are assumed to be onsite for 200 days. An estimate of 10 semi-trucks are assumed to operate daily, traveling an average of 5 miles per day and would be onsite for an average of about 90 days. It is anticipated that approximately 2 onsite trucks and 3 workers' commuter vehicles will be used daily, performing various maintenance and inspection activities. Traffic due to continued O&M activities for the Project is anticipated to be negligible. Impacts to Castle Rock Solar will continue to coordinate with Dakota County and Castle Rock Township to develop a road use agreement that will address road use during construction considering school bus routing, school and commuter traffic, and traffic during state fair (if construction timing overlaps the fair) based on the timing and duration of construction.

There are no railroads with the Project Area and no railroads are expected to be impacted by the Project.

The closest airport to the Project is 0.02 mile east of the Project. The FAA Notice Criteria Tool was used to evaluate the solar generation facilities. Anyone proposing construction or alteration described in CFR § 77.9, must provide adequate notice to the FAA of that construction or alteration.

The FAA Notice Criteria Tool notice received by the FAA is used to:

(1) Evaluate the effect of the proposed construction or alteration on safety in air commerce and the efficient use and preservation of the navigable airspace and of airport traffic capacity at public use airports;

(2) Determine whether the effect of proposed construction or alteration is a hazard to air navigation;

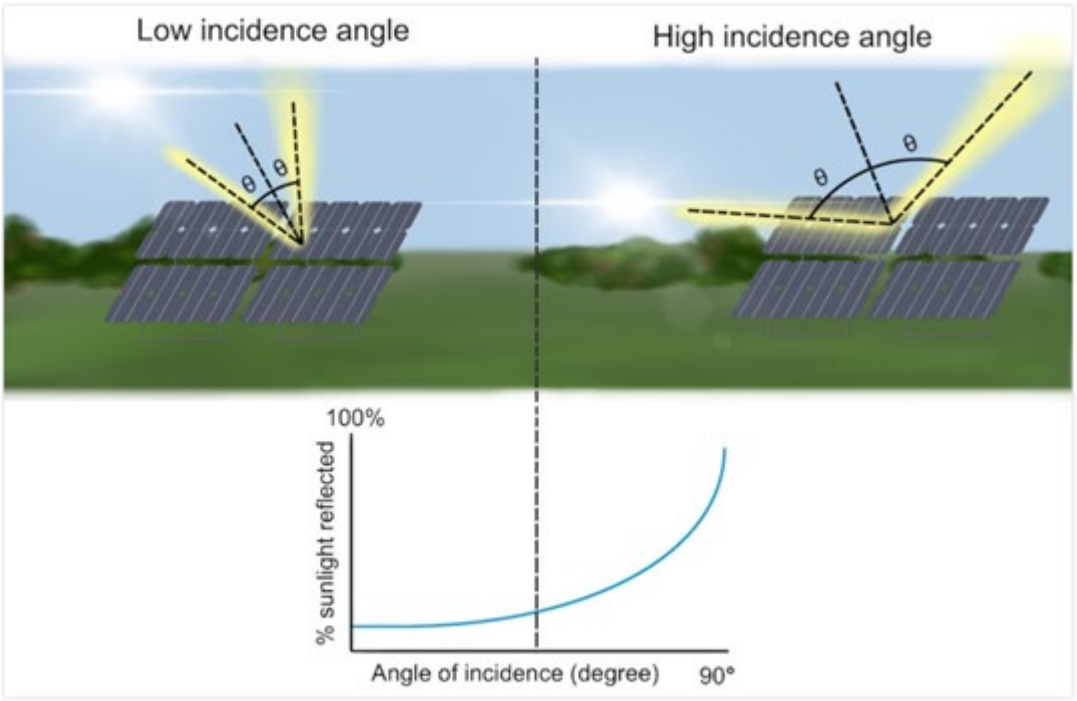
(3) Determine appropriate marking and lighting recommendations, using FAA Advisory Circular 70/7460-1, Obstruction Marking and Lighting;

(4) Determine other appropriate measures to be applied for continued safety of air navigation; and

(5) Notify the aviation community of the construction or alteration of objects that affect the navigable airspace, including the revision of charts, when necessary.

A crane height of 180 feet was used for the entirety of the Project Area as a conservative approach for the evaluation. This height would be the maximum required for a crane during construction to set the main power transformer at the Project substation. Construction equipment required for construction of the remainder of the Project would be much lower and would include equipment such as pile drivers and telescopic handlers. The height of permanent facilities for the Project is much lower than 180 feet as described in Section 2.0. The analysis resulted in a “no-hazard” determination for the Project except for one topographic high point in the southwest portion of the Project. Castle Rock Solar has committed to limiting the height of construction equipment within this area to 125 feet which resulted in a “no-hazard” determination using the FAA Notice Criteria Tool. Notice Criteria Tool results are provided in Appendix C.

The Project is not expected to impact roadways, airports, or airstrips due to glare or glint. Solar panels have an antireflective coating which greatly reduces glare and glint from the panels. As the PV panels will be mounted to single-axis tracking systems, the surface of the panels will be in line with the position of the sun, thereby reducing the potential for steep, glancing angles (i.e., chance for glare) compared to fixed-axis systems (ForgeSolar 2024). Figure 13 shows the advantage single-axis tracking systems have compared to fixed-axis systems as the tracking systems maintain a low incidence angle to reduce the impacts of glare (ForgeSolar 2024).



PV panel reflectance depends on incidence angle between panel normal (i.e. facing) and sun position. Large incidence angle yields more reflected sunlight.

Figure 13: PV Panel Reflectance Diagram

5.3 LAND-BASED ECONOMIES

The following sections discuss agricultural, forestry, tourism, and mining activities within the Project Area, including any potential Project impacts.

5.3.1 AGRICULTURAL

Agricultural land use comprises 87.37 percent of the Project Area and is generally under a corn and soybean rotation, according to the USDA Cropland Data Layer (USDA 2023). The remaining 12.63 percent is comprised of hay/pasture, forested and non-forested wetlands, upland forest, developed, and open water. Additionally, approximately 71 percent (659 acres) of the Preferred and Alternate Development Area are classified as Prime Farmland, which includes Prime Farmland if drained.

According to the USDA's 2022 Census of Agriculture, approximately 208,517 acres (58 percent) of Dakota County (360,064 acres) are used for farmland. There were a total of 841 farms in Dakota County in 2022 with an average farm size of 248 acres. The top crops (in acres) include grain corn, soybeans, vegetables, forage/hay, and corn for silage. Cattle, hogs, and sheep were the three top produced livestock (USDA 2022). A total 2022 market value of $365 million worth of agricultural products were produced and sold. The produced crops accounted for approximately 77.6 percent of the total market value of goods produced

and sold. Livestock, poultry, and products accounted for the remaining approximately 22.4 percent of total market value of goods produced and sold in Dakota County, MN.

The Conservation Reserve Enhancement Program (CREP) is part of the CRP and is a private-land conservation program created by the USDA and administered by the Farm Service Agency (FSA). These voluntary programs pay landowners and/or producers to enroll their environmentally sensitive land out of agricultural production to improve environmental health and quality (USDA-FSA 2013). In Minnesota, land that is enrolled in CREP is also enrolled into a state-funded perpetual conservation easement through the RIM program and is administered by the BWSR (BWSR 2019). No CREP or RIM parcels were identified within the Project Area.

The Green Acres and Rural Preserve programs provide property tax relief for qualifying farmland. The programs work together to limit increases in market value of farmland affected by development pressure and other outside influences. These programs are administered by the counties. There are parcels within the Project Area enrolled in the Green Acres program that will be removed prior to construction.

Impacts and Mitigation

The Solar Facility will impact approximately 934 acres of primarily agricultural land including cultivated crops and hay/pastureland within the anticipated Development Area for the Preferred and Alternate Project Design through conversion of farmland. However, the conversion of farmland to solar facilities is a reduction 0.4-percent of the total farmland in production in Dakota County (208,517 acres). Construction or operation of the Solar Facilities would not prevent agricultural production in the adjacent areas. Topsoil and subsoil disturbances are required to facilitate construction of these facilities and structures such as steel pilings, access roads, inverter skids, fencing, transmission power poles, and the Project substation. Disturbances related to construction include but are not limited to, soil compaction, rutting, erosion, and soil mixing. These impacts can reduce soil health and complicate restoration at the end of the Project's life. If the agricultural land is not appropriately restored at the end of the Project's life, future crop productivity levels could be lowered. Unavoidable impacts will be mitigated through the SWPPP, SPCC, VMP, AIMP, and decommissioning plan. See Section 5.6.4 for further discussion regarding to soils and Prime Farmland.

Therefore, BMPs will be implemented during construction to mitigate long-term impacts to agricultural lands. BMP strategies include:

- Designing access roads, fencing, transmission poles, and other infrastructure in a way that reduces the total disturbance area to the degree practicable;
- Appropriately segregating, stockpiling, and respreading topsoil to minimize soil profile mixing in accordance with the AIMP;
- Halting work during wet or saturated conditions to reduce soil rutting, compaction, and erosion in accordance with the AIMP;
- Decompacting soils in the workspaces following earthwork activities in accordance with the AIMP;
- Ensuring proper site drainage and grading by identifying, avoiding, and repairing any drain tiles or surface drains, in accordance with the AIMP; and

- Implementing erosion control practices such as silt fences, straw wattles, or stockpile stabilization to minimize the loss of agricultural soils to erosion in accordance with the SWPPP.

Some soils designated as Prime Farmland would be taken out of production for the duration of the Project's approximate 35-45-year life and will remain in perennial vegetative cover with the intent to restore it at the end of the Project's life.

Measures to limit the spread of noxious and invasive weeds to the greatest extent practicable will be implemented by cleaning construction equipment and using invasive weed-free mulches, topsoil, and seed mixes, in accordance with the VMP (Appendix E) and SWPPP (Preliminary Stormwater Management Plan included as Appendix G). Erosion control measures and other BMP's will be employed during the initial installation activities and maintained through the post-construction stages. The use of BMPs will be outlined in the Project SWPPP prepared specifically for this Project. The SWPPP and AIMP also discuss topsoil management and soil handling practices to reduce impacts to soil resources to ensure future soil productivity after restoration. Topsoil contains significant amounts of organic matter, plant nutrients, and biological activity, and is critical for successful crop production. The Project-specific VMP developed for the Project outlines restoration procedures for the solar facilities and transmission line structures. Following construction, the Project Area will be seeded to perennial vegetation or restored to pre-construction conditions in accordance with the VMP. Perennial vegetation will protect the soil surface and prevent erosion of topsoil, and depletion of organic matter. Agricultural production (including crop cultivation and hay production) may continue in areas that would not interfere with the operations of the solar facilities, such as outside of the fenced perimeter or access roads.

5.3.2 FORESTRY

The Development Area for the Project is located mostly on agricultural land. Within the Development Area for the Project, approximately 0.15 acre is deciduous and mixed forest under the Preferred Project Design and 0.28 acre under the Alternate Project Design. According to the NLCD, there are no wooded wetlands or shrub/scrub habitat in the Development Area. Though the area contains some forested areas, the Project Area does not contain any forestry resources for commercial use.

Impacts and Mitigation

Though forested areas are present within the Project, no economically significant forestry resources will be impacted, therefore, no mitigation measures are proposed.

5.3.3 TOURISM

Tourist activities in Dakota County include hiking, canoeing, kayaking, skiing, camping, and fishing. However, these recreational opportunities are not located within the Project Area. As discussed in Section 5.2.9, there is one snowmobile trail within the Project Area. The Project Area is just southeast of the City of Farmington, which has many nearby parks.

Impacts and Mitigation

As stated above, Snowmobile Trail 123 runs through the northern portion of the site and will need to be rerouted. Castle Rock Solar is coordinating with the Farmington Sno-Tigers, the club responsible for maintaining the trail, to identify alternative routes and interconnections to the snowmobile trails present in the area. No other impacts to activities associated with tourism are anticipated, and no permanent impacts to tourism are expected.

Short-term increases in noise and dust during construction could impact public enjoyment of nearby recreational activities. However, these impacts would be minimal and BMPs will be used to minimize noise (muffled equipment) and fugitive dust (standard dust suppression techniques) during construction. Further discussions regarding the mitigation of potential noise and fugitive dust emissions during construction can be found in Section 5.2.4 and 5.6.1, respectively.

As stated above, the only necessary mitigation will be to reroute Snowmobile Trail 123.

5.3.4 MINING

Mining activities occur throughout Dakota County but do not comprise a major part of Dakota County's Economy. According to the MnDOT, there are no active aggregate pits within one mile of the Project Area (MnDOT 2023). There are three active commercial aggregate pits within approximately three miles of the Project Area and are identified as Sacks, J Estate 19035; Sibley Aggregate Pit 19126 and [unnamed] 19010. However, only the Sibley Aggregate Pit appears to be active based on 2021 Google Earth Imagery. There is one prospected aggregate pit that is approximately 2.37 miles east of the Project Area near the town of Hampton, MN.

There are no gravel pits or rock quarries within one mile of the Project Area.

Impacts and Mitigation

No mining resources are located within the Project Area. Construction of the Project will likely require aggregate or sand for backfilling and access road construction. This need for material could be sourced from the nearby Sibley Aggregate Pit and would increase the demand in the local area. This rise in demand will be limited to the period during construction.

No direct impacts to mining operations will occur as a result of the Project and no mitigation measures are proposed.

5.4 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

A review of Minnesota SHPO previous survey report data, the MnSHIP, and the OSA Portal online was completed in April of 2024. The literature search focused on previously identified cultural resources (archaeological sites and architectural properties) within the literature search Study Area, defined as the Project Area plus a one-mile buffer. In addition, archival resources were reviewed including the General Land Office maps, county atlases, the University of Minnesota Borchert Map Library, Trygg maps, the National Register of Historic Places (NRHP), and historical aerial imagery to identify potential cultural

features in the Project Area. Online sources for topics such as soils, hydrology, physiography, and the natural environment were also consulted. Upon completion of the cultural resources database review, a model of precontact Native American archaeological site probability was completed. The archaeological site probability model utilized general tendencies of precontact Native American site locations and divided these tendencies into high, medium, and low probability areas.

The literature review found no previous surveys, three archaeological sites, 12 above-ground historic resources, and one mortuary site within the Study Area. Two of the archaeological sites are recorded within the Project Area. A Phase I archaeological reconnaissance survey was conducted on a 390-acre survey area based on the probability model analysis on November 13 to 16, 2023 and May 13 to 15, 2024. One site was not relocated during the current field survey and the site is recommended to remain not eligible for listing on the NRHP. No evidence of the second site was identified during the current field survey; it is recommended that the site remains unevaluated for listing on the NRHP as the bulk of the site is mapped outside of the Project Area. No new archaeological sites were identified as a result of the survey; therefore, a finding of No Historic Properties Affected for the proposed Project is recommended. The "*Archaeological Reconnaissance Survey of The Castle Rock Solar Project Dakota County, Minnesota*," dated August 1, 2024, and the Unanticipated Discovery Plan for the Project are provided in Appendix J.

On October 31, 2024, Castle Rock Solar submitted *An Archaeological Reconnaissance Survey of the Castle Rock Solar Project, Dakota County, Minnesota* (October 22, 2024) and the *Historic Architectural Survey for the Castle Rock Solar Project, Dakota County, Minnesota* (January 8, 2024) for review. On December 12, 2024, SHPO provided a response that SHPO reviewed the submitted report, *An Archaeological Reconnaissance Survey of the Castle Rock Solar Project, Dakota County, Minnesota* (October 22, 2024) as prepared by Stantec. Based on the results of the survey, SHPO determined that there are no known or suspected archaeological resources that will be affected by the Project. SHPO also responded that they reviewed the Historic *Architectural Survey for the Castle Rock Solar Project, Dakota County, Minnesota* (January 8, 2024) and determined that there are no properties listed in the National or State Registers of Historic Places, or within the Historic Sites Network, that will be affected by the Project. This response is provided within Appendix C.

Impacts and Mitigation

No impacts to archaeological or historical resources are anticipated due to construction or operation of the Project. Castle Rock Solar has prepared an Unanticipated Discovery Plan (Appendix J) detailing steps to be taken if unrecorded cultural resources or human remains are encountered during construction. If any unknown archaeological resources are encountered during construction, discoveries will be reported to the SHPO. If human remains are discovered, Minnesota Statue §307.08 will be followed, all work will cease, law enforcement will be contacted, and OSA will be notified.

5.5 TRIBAL COORDINATION

The Applicant notified Tribes of the Project and requested input in Fall 2024. Letters were sent to each of the eleven Tribes in Minnesota, as well as the Minnesota Indian Affairs Council, and the tribes with interests in Dakota County, Minnesota as listed on the Tribal Directory Assessment Tool. As of the preparation of

this document, representatives from the following Tribes responded to the Fall 2024 letter: Leech Lake Band of Ojibwe and Shakopee Mdewakanton Sioux Community.

In general, correspondence from Tribes noted there are no recorded or known burials in the area and that they have no concerns. Some correspondence also requested ongoing coordination regarding the Project. Thus far, no Tribe has expressed concern regarding specific cultural resources within the Project Area. Copies of this correspondence, the letter provided to the Tribes, and the mailing list are included in Appendix C. Castle Rock Solar will continue coordination, including by providing notice of the filing of this Application.

5.6 NATURAL ENVIRONMENT

5.6.1 AIR QUALITY

The Clean Air Act requires the USEPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants, called criteria pollutants, to protect public health and the environment from harmful air pollution. The six criteria pollutants are ground-level ozone (O_3), particulate matter (PM), lead, nitrogen dioxide (NO_2), carbon monoxide (CO), and sulfur dioxide (SO_2). Minnesota is currently meeting the NAAQS standards (MPCA 2023c).

The Air Quality Index (AQI) was developed by the USEPA to provide a way to summarize and report daily air quality conditions (MPCA 2023d). In Minnesota, the AQI is determined based on hourly measurements of five pollutants: fine particles, ground-level O_3, SO_2, NO_2, and CO. The pollutant with the highest AQI value determines the overall AQI for that hour. The MPCA uses 18 monitoring locations around the state to inform the AQI. Fine particle pollution and O_3 are most likely to affect air quality and are monitored at all or nearly all stations. CO, SO_2, and NO_2 rarely influence the AQI and are only monitored at a few sites. The AQI is divided into five categories used to rank the air quality as good, moderate, unhealthy for sensitive groups, unhealthy, or very unhealthy (MPCA 2023d).

The Project is located closest to the air quality monitoring stations in the South Metro area. The most recent annual AQI Days for the South Metro for the years 2015-2022 are provided in Table 23 (MPCA 2023f).

Table 23: Annual Days Per Air Quality Index Category

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2015	314	51	0	0	0
2016	320	45	1	0	0
2017	307	58	0	0	0
2018	282	81	2	0	0
2019	293	72	0	0	0
2020	314	51	1	0	0
2021	276	86	1	2	0
2022	311	54	0	0	0

Source: MPCA, 2023f

Air quality has been considered good for the majority of the past seven reported years in the South Metro. Since 2015, the largest number of days classified as moderate occurred in 2021, with a couple days each in 2016, 2018, 2020 and 2021 where air quality was considered unhealthy for sensitive groups. Two days were classified as unhealthy in 2021, and no days were classified as very unhealthy during 2015-2022 (MPCA 2023f).

Impacts and Mitigation

The Project has the potential to create temporary minor decreases in local air quality during construction as the result of the use of heavy equipment, worker vehicle trips, and truck hauling. However, construction is not expected to exceed regulatory thresholds. Depending on the time of year and soil moisture level, earth moving activities could result in dust emissions during dry conditions. However, dust control could be implemented during construction to reduce the potential for slow moving dust clouds which might degrade air quality through increased particulate matter. Short-term emissions of CO, carbon dioxide (CO_2), NO_2, and PM would also be generated during construction activities. All contractors will be required to follow the SWPPP, as well as adhere to any site-specific environmental requirements including erosion and dust control. BMPs will be used to minimize fugitive dust using standard dust suppression techniques. Castle Rock Solar is committed to using non-chloride dust control measures to prevent harm to wetland and river systems.

The Project will adhere to MPCA rules and standard control measures to mitigate potential impacts. Once the Project is operational, it would not emit harmful air pollutants or GHG and would reduce the need for traditional energy generating facilities, such as coal, natural gas, and oil power plants which do produce air pollutants and GHG emissions (U.S. Department of Energy 2008). Moreover, once Castle Rock Solar is constructed, there would also be a reduction in dust and wind erosion from the site as there will be perennial vegetative cover underneath the solar panels instead of annual row crops which result in exposed soil during several months of the year.

5.6.2 GEOLOGY

Thousands of years of glacial activity has produced diverse and intermixed surficial geological characteristics in Minnesota. Surficial and bedrock geological data were reviewed in the development of this permit application. The Dakota County Geologic Atlas provides surficial and bedrock geological units present in the Project Area (Steenberg, et.al. 2023).

Surficial Geology

The Project Area contains several major surface geological units. They include:

- Pierce Formation Till (pt) - Loam diamicton; Unsorted sediment with a loamy matrix, containing uncommon to common pebbles and rare cobbles and boulders. Pre-Wisconsinan glaciation sediment deposited by ice of Winnipeg provenance.
- River Falls Formation Outwash (rfo) – Sand and gravel; Stratified sand and gravel deposited by subaerial meltwater carrying sediment dominantly from the Superior lobe. Sand ranges from course- to fine-grained and is poorly to well-sorted; cobbly and bouldery in places. Pre-Wisconsinan glaciation sediment deposited by ice of Superior provenance.
- Cromwell Formation St. Croix Phase Outwash (cso) – Sand and gravel deposited by subaerial meltwater carrying sediment dominantly from the Superior lobe. Sand ranges from course- to fine-grained and is poorly to well-sorted; cobbly and bouldery in places. Wisconsinan glaciation sediment deposited by ice of Superior provenance.
- New Ulm Formation Outwash (nuo) – Sand and gravel deposited by subaerial meltwater carrying sediment dominantly from the Des Moines lobe. Sand ranges from course- to fine-grained and is poorly to well-sorted. Wisconsinan glaciation sediment deposited by ice of the Riding Mountain provenance.
- Holocene Alluvium (al) – generally stratified, coarse-grained sand and gravel deposited in fluvial channels, and finer-grained loam, silt, and sand on floodplains. May be interbedded with, or underlying, organic material.
- Organic debris, clay, and silt (pe) – Decomposed organic matter (peat: >50% organics; fine-grained sediment <50% organics), typically deposited in marshes, ponded water, alluvial floodplains, and other depressions in the landscape.

Bedrock Geology

The Project Area resides over two Paleozoic bedrock formations. The oldest formation is the Lower Ordovician Prairie du Chien Group – Shakopee Formation (Ops) and is composed of dolostone, sandy to silty dolostone, sandstone, and shale. The second formation is the Middle to Lower Ordovician St. Peter Sandstone (Os). The upper half to two-thirds of the St. Peter Sandstone is a white to tan-colored fine- to medium-grained, friable, quartzose sandstone. The lower portion includes white to gray feldspathic shale and siltstone interbedded with coarser-grained sandstone (Steenberg, et.al. 2023).

Depth to Bedrock

The depth to bedrock ranges from less than 25 feet to greater than 150 feet within the Project Area. Bedrock depth increases from east to west. Near surface bedrock is possible and should be evaluated further. The Prairie du Chien Group – Shakopee Formation bedrock contains calcium and magnesium carbonates and can dissolve in slightly acidic water. According to the MNDNR, portions of the Project Area are in areas prone to surface karst development, which is identified where there is less than 50 feet of glacial deposits and/or sediments above bedrock (MNDNR 2020). No karst features are identified in the Minnesota Karst Feature Inventory (MNDNR 2024d); however, several isolated tree clusters appear in agricultural fields within the Project Area that may be indicative of potential karst features that have not been evaluated. Karst features are rarely expressed at the surface in areas where carbonate rocks are buried beneath more than 50 feet of glacial deposits (Weary and Doctor 2014). Further geotechnical investigations into potential karst features should be completed in areas with shallow bedrock as the Project progresses.

Impacts and Mitigation

Geotechnical investigations will be performed within the Project Area prior to construction to determine areas of shallow bedrock, karst, and subsurface properties. If any are encountered, appropriate actions will be taken to minimize disturbance and properly engineer the Project. Further, appropriate measures will be implemented to guard against the introduction of contaminants into groundwater due to accidental release of construction-related chemicals, fuels, or hydraulic fluid during construction.

Solar arrays are anticipated to be supported by driven piles. Site suitability for driven piles will be evaluated during geotechnical engineering investigation.

Due to areas with potentially shallow bedrock, excavation of bedrock may be needed in portions of the Project Area. There are no karst features identified within the Project Area; however, several isolated tree clusters appear in agricultural fields within the Project Area that may be indicative of potential karst features that have not been evaluated. Depth to bedrock and potential karst features will be evaluated during the geotechnical engineering evaluation. Impacts of the proposed Project to available geologic resources are likely limited.

5.6.3 GROUNDWATER

The majority of the Project Area is within Minnesota's Groundwater Province 1, this area is characterized by buried sand aquifers and relatively extensive surficial sand plains overlying sedimentary bedrock with good aquifer properties. The southeast portion of the Project Area is within Minnesota's Groundwater Province 3, this area is characterized by thin or absent sediment underlain by productive bedrock aquifers (MNDNR 2021a, MDH 2023). There is one wellhead protection project within the Project Area. There are no USEPA-designated sole source aquifers in the Project Area (USEPA 2024).

The shallow water table is often a subdued expression of surface topography. Shallow groundwater generally flows from areas of groundwater recharge, such as hills and broad uplands, to areas of groundwater discharge, such as wetlands, rivers, and lakes. Based on the local surface topography, local shallow groundwater is expected to flow toward wetland areas within the Project Area or towards the South

Branch Vermillion River which bisects the Project Area. Other artificial features such as wells, roads, filled areas, buried utility lines and sewers, and drainage ditches may alter the natural shallow groundwater flow direction. The depth to shallow groundwater is estimated to be less than 10 feet below grade across the majority of the Project Area. Groundwater in the bedrock aquifer is expected to flow generally northeast.

5.6.3.1 Minnesota Well Index

There are four well log records within the Project Area (MDH-2024). Among the wells listed within the Project Area static water levels range from 35 to 40 feet. Wells located within the Project Area are listed in Table 24 and displayed in Appendix B, Map 7.

Table 24: Minnesota Well Index

Well ID	Use	Date Drilled	Status	Well Depth (feet)
427134	Domestic	12/02/1986	Active	120
243775	Irrigation	06/01/1976	Unknown	190
761673	Irrigation	01/21/2010	Active	240
634974	Domestic	12/16/1999	Active	120

5.6.3.2 Wellhead Protection Areas

The MDH maintains a web map viewer with several types of source water protection areas in Minnesota including Wellhead Protection Area (WHPA), drinking water supply management areas (DWSMA) for wellheads, DWSMA for surface water, and DWSMA vulnerability. Wellhead protection areas represent an area surrounding a public drinking water supply well that can contribute contamination to the water supply, DWSMAs are areas that contain the WHPA, and DWSMA vulnerability is a rating of how likely it is that contamination in the DWSMA can reach the public water supply. Most of the Project Area is located within a WHPA and a groundwater DWSMA. The 60,931-acre DWSMA is for the water supply for the City of Hastings and the portion of the DWSMA within the Project Area has a vulnerability rating of high (MDH 2024b).

5.6.3.3 Special Well and Boring Construction Areas

Special well and boring construction areas have been identified in Minnesota as areas that require special controls when drilling new wells and modifications of existing wells due to groundwater contamination. There are no special well boring construction areas within one mile of the Project Area (MDH 2024c).

5.6.3.4 Pollution Sensitivity

Pollution sensitivity maps for bedrock have been created for 19 counties in Minnesota, including Dakota County. Pollution sensitivity is rated by combining attributes of the bedrock and surficial geologic units including sediment texture, fractures in the bedrock, thickness of material, and depth to the water table.

The pollution sensitivity of the bedrock is depicted on a map and web viewer characterizing the relative rate of vertical travel of a contaminant moving conservatively with water from the land surface to the shallowest bedrock surface. Interpretation of pollution sensitivity of the bedrock surface is based on overlapping estimated time-of-travel ranges. According to the Minnesota Hydrogeology Atlas, the pollution sensitivity for the Project Area is rated from High (weeks to years) to Low-Moderate (several decades) (MNDNR 2016). In general, the areas rated as High sensitivity have shallow limestone or dolomite bedrock while areas rated as Moderate or Low-Moderate sensitivity where sandstone is the first bedrock unit and where thicker surficial geologic units consisting of outwash or till are present (Steenberg, et.al. 2023). The areas of High sensitivity rating are located throughout the Project Area.

Impacts and Mitigation

Although topography of the site will be adjusted to meet slope requirements for the trackers and panels, grading will be kept to a minimum so that drainage patterns of the existing topography are maintained. The proposed land cover (meadow) reduces stormwater runoff rates and erosion compared to the existing primary land cover (row crops). Not only will planting perennial vegetation reduce erosion, but it will also reduce the input of fertilizers and pesticides to the land which will help protect sensitive groundwater resources. The internal access roads will be installed at grade next to the proposed meadow land cover which will allow for a disconnected impervious treatment process. Runoff from the access roads will sheet flow through the new meadow land cover which will help filter the stormwater before it is discharged from the Project. Along with the new land cover, vegetated swales with ditch checks will also be used to further improve water quality of any stormwater that flows offsite.

While solar panels may contain small amounts of toxic metals like cadmium, silver, or lead, working panels do not leach those toxic metals (USEPA 2024). The First Solar Series 7 540-Watt module is being considered in the conceptual design for the Project which is a thin film, cadmium telluride photovoltaic cell solar module. Cadmium telluride photovoltaic cells are sealed between two heat strengthened sheets of glass and include a laminate material with edge seal to protect the semiconductor materials from the outside environment (USEPA 2024).

Any unavoidable impacts will be mitigated through the preliminary stormwater management plan (Appendix G) and associated Project SWPPP, SPCC plan, VMP (Appendix E), AIMP (Appendix D), and decommissioning plan (Appendix H). No other mitigation measures are proposed.

5.6.4 SOILS AND PRIME FARMLAND

Soil characteristics within the Project were assessed using the USDA Soil Survey Geographic database (SSURGO) (Soil Survey Staff 2024). The SSURGO database is a digital version of the original county soils surveys developed by the Natural Resources Conservation Service (NRCS) for use with Geographic Information Systems (GIS) and provides the most detailed level of soils information for natural resource planning and management.

5.6.4.1 Soils

Soils in the Project Area and the surrounding region are derived from glacial and post-glacial activity. The surface soil texture is dominated by sandy loam to silty glacial till and outwash sediments. Repeated periods of glacial activity and erosional forces has washed away soil and deposited it in varying landscape positions. The nature of deposition ultimately influenced the chemical and physical properties that affect their natural chemical and physical properties today. A desktop review using the publicly available SSURGO database was conducted to gather and evaluate key soil characteristics including hydric class, drainage class, and wind erodibility group (Soil Survey Staff 2024).

Soil designated as Hydric, Predominantly Hydric, Predominantly Non-Hydric, and Non-Hydric were identified in the Project Area. The majority of the soils are Predominantly Non-Hydric or Non-Hydric, particularly within the Development Area. The largest concentration of Hydric soil resides in mapped wetlands surrounding the South Branch Vermillion River. The soil in the Project Area ranges from Excessively drained, Well drained, Moderately Well drained, Somewhat Poorly drained, Poorly drained, and Very Poorly drained. Soil hydric and drainage ratings are two of many physical and chemical characteristics that are considered to determine Prime Farmland areas. Soil resources within the Project Area and associated properties are shown in Table 25 with map unit and soil rating classifications. The mapped soil units and their hydric class are shown in Appendix B, Map 10.

Table 25: Soil Units Within the Solar Facility

Map Unit Symbol	Map Unit Name	Hydric Class	Hydric %	Drainage Class	Compaction Susceptibility	Rutting Risk	Wind Erodibility	Acres
1055	Aquolls and Histosols, ponded	Hydric	100	Very Poorly Drained	Low	Severe	8	0.02
1078	Anthroportic Udorthents, 2 to 9 percent slopes	Non-Hydric	0	Moderately Well Drained	Medium	Severe	6	1.46
129	Cylinder loam, 0 to 2 percent slopes	Predominantly Non-Hydric	15	Somewhat Poorly Drained	Medium	Severe	6	21.63
151C	Burkhardt sandy loam, 6 to 12 percent slopes	Non-Hydric	0	Somewhat Excessively Drained	Medium	Moderate	3	6.11
151D	Burkhardt sandy loam, 12 to 18 percent slopes	Non-Hydric	0	Somewhat Excessively Drained	Medium	Moderate	3	6.71
1894B	Winnebago loam, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	26.45

Map Unit Symbol	Map Unit Name	Hydric Class	Hydric %	Drainage Class	Compaction Susceptibility	Rutting Risk	Wind Erodibility	Acres
1895B	Carmi loam, 2 to 8 percent slopes	Predominantly Non-Hydric	5	Well Drained	Medium	Severe	5	7.06
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	59.05
213B	Klinger silt loam, 1 to 5 percent slopes	Predominantly Non-Hydric	5	Somewhat Poorly Drained	Medium	Severe	6	55.62
250	Kennebec silt loam	Non-Hydric	0	Moderately Well Drained	Medium	Severe	6	5.80
252	Marshan silty clay loam	Predominantly Hydric	90	Poorly Drained	Low	Severe	6	0.74
27B	Dickinson sandy loam, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Moderate	3	9.48
283A	Plainfield loamy sand, 0 to 2 percent slopes	Non-Hydric	0	Excessively Drained	Low	Moderate	2	2.67
283B	Plainfield loamy sand, 2 to 6 percent slopes	Non-Hydric	0	Excessively Drained	Low	Moderate	2	3.51
299B	Rockton loam, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	5.38
2B	Ostrander loam, 1 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	72.67
2C	Ostrander, 6 to 12 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	19.48
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	Non-Hydric	0	Wel Drained	Medium	Severe	6	19.48
313	Spillville loam, 0 to 2 percent	Predominantly Non-Hydric	10	Somewhat Poorly Drained	Medium	Severe	6	3.92

Map Unit Symbol	Map Unit Name	Hydric Class	Hydric %	Drainage Class	Compaction Susceptibility	Rutting Risk	Wind Erodibility	Acres
	slopes, occasionally flooded							
378	Maxfield silty clay loam	Predominantly Hydric	95	Poorly Drained	Low	Severe	6	62.81
39B	Wadena loam, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	208.60
39C	Wadena loam, 6 to 12 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	0.52
409B	Etter fine sandy loam, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Moderate	3	11.44
409C	Etter fine sandy loam, 6 to 12 percent slopes	Non-Hydric	0	Well Drained	Medium	Moderate	3	6.02
411B	Waukegan silt loam, 1 to 6 percent slopes	Non-Hydric	0	Well Drained	Low	Severe	6	61.19
411C	Waukegan silt loam, 6 to 12 percent slopes	Non-Hydric	0	Well Drained	Low	Severe	6	2.40
415B	Kanaranzi loam, 2 to 6 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	75.62
415C	Kanaranzi loam, 6 to 12 percent slopes	Non-Hydric	0	Well Drained	Medium	Severe	6	3.22
41B	Estherville sandy loam, 2 to 6 percent slopes	Predominantly Non-Hydric	1	Somewhat Excessively Drained	Medium	Moderate	3	22.23
495	Zumbro fine sandy loam	Non-Hydric	0	Well Drained	Medium	Moderate	3	1.46
539	Klossner muck, 0 to 1 percent slopes	Hydric	100	Very Poorly Drained	Low	Severe	2	6.20

Map Unit Symbol	Map Unit Name	Hydric Class	Hydric %	Drainage Class	Compaction Susceptibility	Rutting Risk	Wind Erodibility	Acres
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	Non-Hydric	0	Excessively Drained	Medium	Moderate	5	89.05
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	Non-Hydric	0	Excessively Drained	Medium	Moderate	5	11.19
81B	Boone loamy fine sand, 2 to 6 percent slopes	Non-Hydric	0	Excessively Drained	Low	Moderate	2	7.63
81C	Boone loamy fine sand, 6 to 12 percent slopes	Non-Hydric	0	Excessively Drained	Low	Moderate	2	19.50
98	Colo silt loam, occasionally flooded	Predominantly Hydric	95	Poorly Drained	Medium	Severe	6	0.74

Impacts and Mitigation

Soil disturbances are anticipated during the construction and operation phases of the Project. Construction will likely result in soil compaction, rutting, and soil mixing. Soil compaction and/or rutting may occur from any equipment traffic and installation of the solar array footings. Soil mixing can occur during site grading, soil stripping, and soil handling leading to altered topsoil properties. Compaction and rutting can degrade soils by reducing the ability of water to drain through the soil and ponding, and by reducing the growth of plant roots. To avoid these risks, the Applicant will decompact potentially compacted areas via deep tillage and strip and stockpile topsoil appropriately based of changes in soil color and/or texture. Any excavated areas will be backfilled first with subsoil followed by topsoil.

During Project operation, soil compaction and rutting is anticipated to be localized to access roads. Erosion may occur from the access roads and will be mitigated by establishing permanent vegetation within the fence. Areas outside of the fence will be returned to its previous land use.

An NPDES/SDS Construction Stormwater General Permit to discharge will be acquired from the MPCA. An SWPPP will be developed in accordance with the NPDES. The SWPPP will implement BMPs such as temporary seeding/stabilization, erosion blankets, and silt fencing to protect exposed soils to prevent erosion. Both the preferred and alternate Project layouts will disturb approximately 934 acres and are adjacent to an impaired water (South Branch Vermillion River). Therefore, the Applicant will submit the SWPPP to MPCA for review and approval at least 30 days prior to construction.

Stormwater on the site will be managed through a series of vegetated swales with ditch checks in accordance with MPCA and NPDES stormwater management standards. The quantity, placement, and size of the swales were determined through a detailed stormwater management study for the Project provided in Appendix G. As stated, stormwater management systems were developed in accordance with the MPCA solar project guidance and NPDES/SDS Construction Stormwater General Permit. The NPDES/SDS Construction Stormwater General Permit stipulates post-construction BMPs must treat 1.0-inch of runoff from new impervious surfaces, primarily gravel access roads in the case of solar installations. All stormwater management BMPs have been designed to meet storage volumes and provide the necessary treatment. These areas will be vegetated with a wet seed mix that will help stabilize exposed soils after rain events.

Additionally, the Applicant will work with participating landowners to identify and avoid existing drain tile currently functioning to drain hydric soil areas. Drainage will be augmented by additional drain tile, as needed, in areas of known hydric soils to ensure proper drainage is maintained in the post-construction condition.

5.6.4.2 Prime Farmland

Prime Farmland is defined by the USDA as land that has the "best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oil seed crops...". Prime Farmland is relatively rock-free, not excessively drained or saturated, not commonly flooded or erodible, and chemically neutral. Prime Farmland is not designated in developed/urban areas or open water. Additionally, areas that are not designated as Prime Farmland can be if the limiting condition is mitigated (such as protected from flooding, drained, or irrigated; USDA-NRCS 2024). Prime Farmland and Farmland of Statewide Importance are protected under the Farmland Protection Policy Act due to their value in agricultural production, and the loss of premium cropland could lead to local economic impacts to the agricultural industry and practitioners.

The Project Area is comprised of approximately 584.9 acres of Prime Farmland, 126.4 acres of Farmland of Statewide Importance, 63.6 acres of Prime Farmland if drained, and 0.07 acres of Prime Farmland if protected from flooding or not frequently flooded during the growing season (Table 26, Appendix B, Map 6). Approximately 158.6 acres are designated as Not Prime Farmland. Areas designated as Not Prime Farmland are generally concentrated around the wetland and stream complex to the north of the Project Area and correlate to previously delineated aquatic resources. Under Minn. R. 7850.4400, subp. 4, the use of Prime Farmland for energy generating facilities is limited to 0.5 acres per 1 MW unless there is no feasible alternative. Therefore, the 150 MW_{ac} Project can use up to 75 acres of Prime Farmland unless the Project qualifies under an exception to restriction or there is no feasible or prudent alternative to the Project. These acres of Prime Farmland would be removed from production throughout the anticipated 35-45-year Project life with the intent to restore it to productive at the end of the Project's life. Therefore, the Prime Farmland taken out of production for the Project's life would not be permanently removed. Section 3.1.2 discusses how the Project qualifies for an exception to the Prime Farmland Rule.

Table 26: Prime Farmland Classifications within Project Area

Farmland Classification	Acreage	Percent of Project Area
Prime Farmland	584.9	62.6
Prime Farmland if Drained	63.6	6.8
Prime Farmland if Protected from Flooding	0.74	0.1
Farmland of Statewide Importance	126.4	13.5
Not Prime Farmland	158.6	17.0
Total	**934.24**	**100.0**

Impacts and Mitigation

Prime Farmland will be disturbed during the construction phase of the Project due to site grading for solar array installation, access roads, and other components. Site-wide grading through Prime Farmland may cause compaction, rutting, and soil mixing and alter the unique properties that contributed to its Prime Farmland designation if mitigative efforts are not used. Compaction and rutting can reduce infiltration, subsurface drainage capabilities, and increase surface ponding and runoff. Additionally, installing the solar array footings can further result in soil compaction and rutting. Meanwhile, stripping (grading) and stockpiling can mix subsoil and topsoil and alter the chemical properties that support crop production. Overall, there will be an estimated 75 acres of grading and 11,084 cubic yards to cut and fill to construct the Preferred Project Development Area. This number represents approximately 8.0 percent of the Preferred Project Development Area. A preliminary grading plan for the Preferred Project Development Area is provided as Appendix A.5 of the Preliminary Stormwater Management Plan provided as Appendix G of this Application.

Potential impacts to Prime Farmland will be mitigated through the proper installation and maintenance of BMPs such as slope breaks, soil tilling/ripping, halting construction during wet weather conditions, and seeding any exposed stockpiled soils. Additionally, appropriate stripping practices will be used when conducting site grading such as stopping at a change in color or texture. The Development Area will also be regraded and have any disrupted drainages repaired. As stated in previous sections, the Applicant will develop a SWPPP that follows all MPCA rules and guidelines. Successful implementation of the Project SWPPP will minimize the risk of soil erosion and other environmental impacts associated with construction.

The Applicant has prepared a detailed Agricultural Impact Mitigation Plan (Appendix D) and a separate Vegetation Management Plan (Appendix E) outlining how soils and vegetative cover will be managed during and after construction for the conservation of soil resources and wildlife habitat enhancement.

5.6.5 SURFACE WATERS AND FLOODPLAINS

5.6.5.1 Wetlands and Watercourses

The National Wetlands Inventory (NWI) map identifies several wetlands and larger wetland complexes within the Project Area, as shown in Appendix B, Maps 4a and 4b. Wetlands identified by the NWI include emergent, scrub-shrub, forested, riverine, and freshwater pond wetlands with emergent and scrub-shrub wetlands accounting for the majority of the NWI wetlands. Many of the NWI wetlands are part of a large series of wetlands associated with the South Branch Vermillion River which crosses through three portions of the Project Area.

A review of the MNDNR Protected/Public Waters Inventory (PWI) was conducted to determine if any waterways within the Project Area have been mapped by the MNDNR (MNDNR1985). The PWI identifies one mapped MNDNR public watercourse, the South Branch Vermillion River (M-049-005), within the Project Area (Appendix B, Maps 11a and 11b). The Project is located within the Vermillion River watershed and the South Branch Vermillion River, which flows through the Project Area and joins the main stem of the Vermillion River before flowing into the Mississippi River near Hastings, Minnesota.

A review of USDA FSA, National Agriculture Imagery Program aerial imagery and other available aerial imagery was conducted for the farmed areas within the Study Area and are shown within the Wetland Delineation Report (Appendix K). This effort was conducted to assist in the delineation of farmed wetlands, though the final wetland boundaries were identified in the field.

On-site wetland delineations were completed for the Project Area based on the criteria and methods outlined in the Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1 (USACE 1987) and applicable Regional Supplements to the Corps of Engineers Wetland Delineation Manual (USACE 2010). The northwest corner of the Project Area has a previously approved wetland delineation which was completed by Kimley-Horn and Associates in October 2023. The NOD was issued for the delineation of 314 acres of Section 4 in Township 113N, Range 19W by the LGU on February 23, 2024. The NOD is included in Appendix K.

Field investigations for the remainder of the Project Area were performed October 17-21, 2022, and October 11-12, 2023. Boundary concurrence on the delineated wetlands and waterways was requested on August 22, 2024, from the WCA LGU, which is the Dakota SWCD, and the USACE. The WCA LGU issued a Notice of Application on August 29, 2024. An NOD approving the wetland boundaries was issued by the WCA LGU on December 26, 2024. The USACE provided a response on August 27, 2024, stating that the USACE will rely on the WCA LGU to make the initial evaluation of the wetland boundaries. Castle Rock Solar will submit a permit application to the USACE once final design is complete to identify the aquatic resources that are subject to USACE regulation and determine if a USACE permit authorization is required. The wetland delineation report and NOD are provided in Appendix K.

The boundaries of 22 wetlands and one open water feature were delineated within the Project Area with a combined total of 137.10 acres of wetlands and 3.25 acres of an open water feature. Wetlands were mostly composed of farmed, shrub-carr, wet meadow, floodplain forest, and hardwood swamp wetland communities with minor amounts of swallow marsh and sedge meadow wetland communities also present.

The wetlands are summarized in Table 27 and displayed in Appendix B, Maps 11a and 11b. Features with the KH prefix are wetlands or waterways that were delineated by Kimley-Horn. Uplands within the Project Area were primarily composed of cultivated cropland, prairie, grassland, and upland forest. Agricultural crops within the Project Area included field corn and soybeans.

A total of six waterways were identified and delineated within the Project Area and summarized in Table 27. The locations of all waterways in the Project Area are shown in Appendix B, Maps 11a and 11b and Appendix K. S1 corresponds with the South Branch Vermillion River. Some of the waterways appear to have been altered or ditched, including S3, S4, and a portion of S1. S1 crosses through the Project Area several times and the other three streams are all tributaries to S1, though their confluences with S1 are not located within the boundary of the Project Area. S1 flows through a large wetland complex and the other three streams are primarily associated with agricultural fields. KH-ES1 and KH-ES2 are ephemeral waterways associated with KH-W3. A total of 12,269 linear feet of waterways were field delineated within the Project Area as part of the wetland delineation conducted for the Project.

Table 27: Field Delineated Wetlands and Watercourses

Feature ID[1]	Field Verified Feature Type[2]	NWI Mapped Type[3]	Acres
Wetlands			
W1	Degraded wet meadow	---	0.61
W2	Degraded wet meadow, Farmed wetland, Hardwood swamp, Shrub-carr, Sedge meadow	PEM1Cd, PEM1A, PSS1Ad, PSS1Cd	42.06
W3	Degraded wet meadow	---	0.50
W4	Degraded wet meadow	---	0.64
W5	Degraded wet meadow, Farmed wetland	---	0.02
W6	Degraded wet meadow, Farmed wetland	PEM1Ad	0.31
W7	Degraded wet meadow, Hardwood swamp	---	1.15
W8	Degraded wet meadow, Farmed wetland, Hardwood swamp	PEM1Ad	13.61
W9	Degraded wet meadow, Floodplain forest, Hardwood swamp, Shrub-carr, Shallow marsh, Sedge meadow	PSS1Cd, PEM1Cd, PEM1A, PFO1A, PEM1A	39.31
W10	Degraded wet meadow, Farmed wetland, Hardwood swamp, Shrub-carr	PEM1A	4.99
W11	Farmed wetland	---	0.86
W15	Floodplain forest, Shrub-carr	PFO1A, PSS1A, PEM1A	14.84
W16	Degraded wet meadow	PEM1A, PEM1C	1.47
W18	Wet meadow, Degraded wet meadow, Floodplain forest	PEM1C	3.32
KH-W1	Degraded wet meadow, Shallow marsh	PEM1Af	4.60
KH-W2	Farmed wetland	---	0.24
KH-W3	Degraded wet meadow, Shallow marsh, Shrub-	PSS1, PEM1Ad,	1.54

Feature ID[1]	Field Verified Feature Type[2]	NWI Mapped Type[3]	Acres
	carr	PEM1Af	
KH-W4	Farmed wetland	---	0.60
KH-W5	Degraded wet meadow, Shrub-carr	PEM1Ad	4.04
KH-W6	Farmed wetland	---	0.44
KH-W7	Farmed wetland	---	1.32
KH-W8	Farmed wetland	---	0.64
		Total	**137.10 acres**
Open Water Feature			
OW1	Open Water	PABH	3.25
Waterways		**NHD Mapped Type[3]**	**Length (ft)**
S1	Perennial – South Branch Vermillion River	Perennial Stream	5,948
S2	Perennial	---	643
S3	Perennial	Intermittent Stream	3,442
S4	Perennial	---	1,485
KH-ES1	Ephemeral	---	597
KH-ES2	Ephemeral	---	154
		Total	**12,269 ft**

[1]Only features located within the Project Area are included.
[2] Wetland type based on Eggers & Reed 2015.
[3] NWI wetland and NHD waterbody types may or may not correspond to field observed wetland and waterbody types. NWI uses Cowardin 1979 wetland community types.

Impacts and Mitigation

The Project is designed to avoid and minimize impacts to wetlands and watercourses as much as possible. The majority of wetlands and waterways will be avoided. The current design will temporarily impact 6.96 acres of wetlands and permanently impact 0.06 acres, as shown in Table 28 and Appendix B, Maps 4a, 4b, 11a and 11b. The wetlands within the Project Area are mostly comprised of non-forested communities, including degraded wet meadows and shrub-carr wetlands. Many of these wetlands have been impacted over time by intensive farming activities and drainage manipulation. These wetlands are generally of lower-quality and dominated by invasive or non-native species. The forested wetlands within the Project Area include floodplain forest and hardwood swamps and are either small, isolated communities or are associated with the Vermillion River South Branch wetland complex corridor and are avoided.

Table 28: Wetland Impacts within Project Area

Wetland Impacts by Project Component	Impact Type	Acreage
Solar Array	**Temporary**	**1.30**
Farmed Wetland	Temporary	1.30
Collection Lines	**Temporary**	**0.10**
Farmed Wetland	Temporary	0.02
Degraded Wet Meadow	Temporary	0.08
Hardwood Swamp	Temporary	0.0005
Fence	**Temporary**	**5.56**[1]
Farmed Wetland	Temporary	5.56[1]
Access Roads	**Permanent**	**0.06**
Farmed Wetland	Permanent	0.02
Degraded Wet Meadow	Permanent	0.04
	Total	**7.02**[2]

[1] This impact represents total wetland area inside the Project fence including wetland area that is within the solar array, collection line and access road.
[2]This total represents the sum total of wetland area inside the Project fence, within the solar array area, collection line, and access road and therefore where impacts associated with the solar array, and the portions of the collection line and access roads inside the fence double count the wetland impacts. Actual total wetland impacts would be less than the 7.02 acres reported here.

Wetlands have been avoided to the extent practicable, but due to the size and configuration of the Project, wetland impacts are not completely avoidable. As per typical permit conditions established by the USACE for construction within wetlands, Castle Rock Solar will continue to evaluate ground conditions within wetland areas where panels and perimeter fence will be constructed. Castle Rock Solar commits to the use of construction matting, low ground pressure equipment, or completing construction activities during frozen ground conditions as a means to avoid wetland impact from construction equipment. The wetlands to be temporarily impacted by the Project are primarily comprised of farmed wetlands (Table 28). These wetland areas will be restored and revegetated after construction is completed as described in the VMP in Appendix E.

The Project facilities that will require waterway crossings include access roads and the collection system. Other Project facilities, such as the panels and associated facilities and the substation, will not impact waterways. The proposed waterway crossings are necessary to meet the location and constructability requirements of the Project. Based on current Project design, the Project access roads will intersect with two waterways, S3 and S4, which function as agricultural drainage ditches at two locations and cross four wetlands, KH-W6, W1, W2, and W8 (Appendix B, Maps 4 and 11; Appendix K). An official USACE jurisdictional determination can only be made by USACE, however based on their hydrologic connection with the Vermillion River South Branch, it is likely that three of the four wetlands (W1, W2, and W8) impacted

by roadways would be determined jurisdictional by USACE. The remaining wetland impacted by an access road, KH-W6, is likely isolated and would not be determined to be USACE jurisdictional. Access roads across waterways and wetlands will utilize metal corrugated culverts as necessary to maintain waterway flow and hydrology. No waterways would be traversed with equipment for temporary access roads (e.g., temporary clean-span bridges).

Collector systems for the Project would cross two ditched waterways (S3 and S4) and two farmed wetlands (W8 and KH-W6) via vibratory plow method, resulting in a temporary impact; and one waterway (S1 at two locations) and three wetlands (W1, W2 and W9) via HDD or bore method to avoid impacts to the wetland. Bore pits would be located in upland areas, set back from the wetland. Impacts from construction of the fence would be temporary and wetlands would be reseeded with native seed following construction, as necessary. Driven piers used to support the solar arrays are not anticipated to result in wetland loss under the Minnesota WCA or to constitute wetland fill under Section 404 of the CWA. The piers would not alter the wetland's cross-section or hydrological characteristics, obstruct flow patterns, significantly alter the wetland function and value, change the wetland boundary, or convert the wetland to non-wetland (Minn. R. 8420.0111, subps. 26 and 32).

A large portion of existing wetlands present within the Project Area are farmed wetlands and some of watercourses are agricultural ditches. Operations of the Project will likely improve these aquatic features by plantings of perennial cover that will reduce soil erosion and other possible pollution from entering public waters.

Vegetated buffers will be utilized around wetlands and waterways and will comply with the buffer requirements established by the VRWJPO. VRWJPO buffer rules vary for wetlands and must average between 25 and 50 feet and be a minimum of 16.5 to 30 feet, depending on the quality of the wetland (Vermillion 2024). Stream buffer width requirements are an average of 150 feet and minimum of 100 feet along the South Branch Vermillion River and an average of 50 feet and minimum of 35 feet along the tributaries to the river. Vegetated buffers in the Project Area will meet or exceed the watershed buffer requirements.

5.6.5.2 Floodplains

The Federal Emergency Management Agency (FEMA) National Flood Hazard Layer Viewer (FEMA 2024) and appropriate Flood Insurance Rate Map (FIRM) were reviewed to determine the presence of designated floodplains within the Project Area (FEMA 2011). Based on a review of the FEMA data, there is a FEMA designated floodway and floodplain, associated with the South Branch Vermillion River in the Project Area (Appendix B, Maps 12a and 12b). Within the Project Area, 28.65 acres are designated as a Floodway (Zone AE) and must be kept free of encroachment. Approximately 42.41 acres in the Project Area were identified as a designated floodplain (Zone AE) with a 1 percent chance of annual flooding (or 100-year FEMA flood zone). An additional 10.06 acres of the Project Area were identified as a designated floodplain with a 0.2 percent chance of annual flooding (or a 500-year FEMA flood zone). FEMA has completed a study for this area establishing base flood elevation. Floodplains are shown in Appendix B, Maps 4, and 12.

Minnesota's Shoreland Management Program, set through State Rules 6120.2500 – 3900, provides statewide standards that regulate local governmental units' ability to adopt land use controls to provide for

the orderly development and protection of Minnesota's shorelands. Dakota County zoning maps indicate that there are shoreland and floodplain zoning districts designated within the Project Area (Appendix B, Map 13). The shoreland and floodplain zones are classified as a special protection district and correspond with the Vermillion River - South Branch and its tributaries; aboveground Project components will be located outside these zones.

Impacts and Mitigation

The solar arrays, inverters, switchyard, substation, and O&M facility will be located outside of the designated floodplains and floodways, as well as the shoreland zoning district. There are two collection lines which will cross through the FEMA floodplain and floodway; however, the collection lines will be installed via HHD/bore or will be overhung across this area and will not affect or be affected by flooding. Construction of the proposed Project will primarily occur in areas that are currently used for agriculture. The Project will add perennial vegetative cover under the solar arrays, which will likely improve infiltration, prevent soil erosion and other potential pollution from entering public waters, and reduce the volume of water draining into the floodplain and floodway. As a result, the Project is not expected to negatively affect the floodplains and floodways, therefore, no mitigation is required.

5.6.5.3 Water Quality

There is one MPCA impaired water in the Project Area (MPCA 2024a). The Vermillion River, South Branch (AUID: 07040001-706), crosses through the Project Area and is impaired for aquatic recreation because of fecal coliform levels.

Within the Project Area, the MPCA has conducted Index of Biotic Integrity (IBI) surveys. An IBI is used to assess the health of watersheds by evaluating the biologic condition of the water resource; it provides information on the ability of the aquatic ecosystem to support and maintain a healthy community of organisms. Low IBI scores indicate a high proportion of species tolerant of pollution and human disturbance, while high scores indicate a high proportion of species intolerant of pollution and human disturbance. The MPCA has surveyed fish and macroinvertebrates (Station ID: 08LM118) in the South Branch Vermillion River (AUID: 07040001-706) in 2008. The IBI score for fish at this station was 72, rated as good, and the IBI score for macroinvertebrates was 48, rated as fair (MPCA 2024b).

Minnesota designates some waterbodies as Outstanding Resource Value Waters (ORVW) based on their high water quality, wilderness characteristics, unique scientific or ecological significance, exceptional recreational value, or other special qualities which warrant protection from pollution. There are no ORVW identified within the Project Area or nearby (MPCA 2024c). The South Branch Vermillion River has a trout designation from the VRWJPO starting east of Blaine Avenue, which is approximately a quarter mile east of the Project boundary.

Impacts and Mitigation

Potential impacts to water quality primarily include sedimentation to wetlands and watercourses associated with construction and operation of the Project. Temporary construction impacts will be avoided and minimized. Prior to construction, a NPDES/State Disposal System permit for stormwater associated with

construction activities will be obtained from the MPCA and a SWPPP will be developed for the Project. Project development will comply with the NPDES permit requirements and BMPs will be used during construction activities to control soil erosion and sedimentation.

With the proper implementation of the SWPPP, construction of the proposed Project should not result in impacts to surface water quality during construction; thus the proposed Project should not have a significant adverse effect on water quality. Vegetated buffers surrounding wetlands and streams will be incorporated in accordance with Vermillion River Watershed JPO rules, benefiting water quality. The majority of the proposed Project will occur in areas currently used for agriculture and development of the Project with perennial cover will likely improve the land's ability to prevent soil erosion and other possible pollution from entering public waters and impacting water quality. The addition of perennial cover would likely improve water infiltration, decrease water and soil runoff and thereby improve stream conditions for trout downstream.

5.6.6 VEGETATION

As stated in Section 5.1, according to the ECS and data available through the Minnesota Geospatial Commons, the entire Project Area falls within the Eastern Broadleaf Forest Province. Within this Province, the majority of the Project Area is located within the Minnesota & NE Iowa Morainal Section (222M) and the Oak Savanna Subsection (222Me) (MNDNR 2023a, MNDNR 1999).

The primary pre-settlement vegetation was bur oak savanna, but areas of tallgrass prairie and maple-basswood forest were common. Tallgrass prairie was concentrated on level to gently rolling portions of the landscape, in the center of the subsection. Bur oak savanna developed on rolling moraine ridges at the western edge of the subsection and in dissected ravines at the eastern edge. Maple-basswood forest was restricted to the portions of the landscape with the greatest fire protection, either in steep, dissected ravines or where stream orientation reduced fire frequency or severity (MNDNR 2023b).

Current vegetation within the Project Area is primarily cultivated crops, along with some small deciduous forested areas, herbaceous land cover, and several wetland types including wet meadow, sedge meadow, shallow marsh, shrub-carr, hardwood swamp, and floodplain forest. NLCD land cover type acreages are provided in Table 20 and shown in Appendix B, Map 9 and are further discussed in Section 5.2.11.

Impacts and Mitigation

The existing vegetative land cover within the Project Area is primarily cultivated cropland currently planted in corn and soybeans. Land cover impacts for the Solar Facility are shown in Table 21 in Section 5.2.11. The ground under the solar array will be seeded with low growing, native perennial vegetative cover after the solar panels are installed, as described in the VMP (Appendix E). The native cover will build soil health and provide improved wildlife habitat when compared with the existing row crop agriculture currently present. Pollinator areas with taller, native vegetation may be located in perimeter areas outside of the fenced solar array area.

Two laydown yards are proposed to support the Project construction and both are located in areas that are currently in agricultural production (Appendix B, Maps 3a and 3b). The larger laydown yard will host solar

arrays with permanent perennial herbaceous cover established under the arrays in accordance with the Project's VMP. The smaller laydown yard will be reclaimed and restored with perennial vegetation but will not host solar panels. The laydown yards would be in place for approximately 12 to 24 months during construction before they are reclaimed. After construction is complete the gravel surface installed for the laydown areas will be removed, the soil will be de-compacted, and the site will either be seeded or immediately returned to agricultural or existing land use, as stipulated by the landowner agreements. Restoration and revegetation of these areas are described in the AIMP in Appendix D and the VMP in Appendix E.

The switchyard and substation will be located in areas that are currently agricultural fields. Following completion, the switchyard and substation will be unvegetated with gravel groundcover.

At the end of the Project's useful life, the Project would cease operation. At that time, the facilities would be decommissioned and dismantled, and the site restored to its preconstruction condition in accordance with the Project Decommissioning Plan (Appendix H). If previously farmed, the site may be returned to agricultural production or a developed land use as determined by the underlying landowners.

5.6.7 WILDLIFE

The Project Area consists primarily of cultivated crops, along with the South Branch Vermillion River and its associated wetlands; small, forested areas; a prairie; and some additional wetlands. Wildlife within and near the Project Area can generally be separated into avian species and other wildlife taxa including reptiles, mammals, and insects. Based on the Minnesota Breeding Bird Atlas (2024) 150 bird species were recorded in Dakota County. The 150 bird species are comprised of resident and migratory species. Migratory birds are federally protected under the Migratory Bird Treaty Act (MBTA) and bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by USFWS. The USFWS is responsible under the MBTA for proactively preventing the mortality of migratory birds. USFWS recommendations include clearing forested habitat outside the nesting season, which is generally March 1 to August 31, and conducting nest surveys prior to clearing to avoid injury to eggs or nestlings. The USFWS Ecological Services Field Office located in Bloomington, Minnesota is the regional office responsible for project reviews regarding migratory bird species in Dakota County. There are no Audubon designated Important Bird Areas (IBA) located within the Project Area (MNDNR 2024c). The closest IBA is the Lake Byllesby IBA located approximately 6.6 miles southeast of the Project Area.

In addition to birds, other wildlife taxa that may occur in the Project Area include mammals, reptiles, and insects. Mammals that may occur within the Project Area include white-tailed deer (*Odocoileus virginianus*), striped skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*). Reptiles that may occur in the Project Area include the plains garter snake (*Thamnophis radix*), common garter snake (*Thamnophis sirtalis),* snapping turtle (*Chelydra serpentina*), and western painted turtle (*Chrysemys picta bellii*). Amphibians that may occur within the Project Area include the northern leopard frog (*Lithobates pipiens*), green frog (*Lithobates clamitans*), and American toad (*Anaxyrus americanus*). Watercourses within the Project Area include the

South Branch Vermillion River and several stream tributaries (see Section 5.6.5 and Appendix B, Maps 11a and 11b). The river channel within the Project Area averages only a couple feet wide and is surrounded by a low-quality wetland dominated by reed canary grass. The MPCA identified 13 fish species during a IBI survey of fish in the South Branch Vermillion River in 2008 (see Section 5.6.5.3, MPCA 2024b). Fish species identified included several minnow, darter, and dace species, as well as a chub and sucker species. The IBI survey conducted by the MPCA also surveyed macroinvertebrates. Macroinvertebrates from 19 families were identified by the survey and the overall quality of macroinvertebrate species found was rated as fair by the IBI index score. Amphibians and reptiles were not surveyed by the MPCA. Some pollinator insects may be present in the Project Area including native bees, butterflies, and moths.

No managed wildlife areas are present within the Project Area. Hampton Woods WMA is located 0.75 mile east of the Project Area and is the closest wildlife management area (Appendix B, Maps 5 and 8). The Vermillion River WMA and Vermillion River (Dakota) Aquatic Management Area (AMA) are located 2.25 miles north of the Project Area and the South Branch Vermillion River AMA is located 2.80 miles northeast (Appendix B, Map 5).

Impacts and Mitigation

While there is land near the Project Area that is comprised of natural areas and diverse wetland habitats capable of supporting various wildlife, including high conservation priority species, the habitat within the Project Area is dissimilar and is largely considered unsuitable habitat except for common bird and wildlife species more typical of agricultural settings. The Project is anticipated to have minimal negative impact on wildlife species and their preferred habitats since the majority of the Project Area consists of actively tilled agricultural land and habitat within the river corridor will generally be avoided by the Project. Anticipated impacts are generally expected to be of short duration and limited to the period of construction activities. During construction, wildlife friendly erosion control materials will be used.

Sedimentation and turbidity, alteration or removal of instream and stream bank cover, stream bank erosion, introduction of water pollutants, and water depletions that could impact fisheries and aquatic species are not anticipated for the Project. Impacts to streams and wetlands, including the South Branch Vermillion River, will be mitigated through the SWPPP, SPCCC, VMP, and AIMP and their respective BMPs as described in Section 5.3.1. The Project is designed to avoid and minimize impacts to wetlands and watercourses as much as possible as discussed in Section 5.6.5. Indirect wildlife impacts associated with construction noise and increased human activity will be temporary and could include abandoned reproductive efforts, displacement, and avoidance of work areas. However, both direct and indirect impacts on wildlife within and adjacent to the Project Area generally will be of short duration and limited to the period of construction activities. BMPs will be used to minimize noise (muffled equipment) and fugitive dust (standard dust suppression techniques) during construction. Further discussions regarding the mitigation of potential noise and fugitive dust emissions during construction can be found in Section 5.2.4 and 5.6.1, respectively.

The Project Area will be planted with a mix of low-growing native perennial vegetation under the solar panels as described in the VMP in Appendix E. As the native vegetation will replace the row crops currently cultivated in the Project Area, the Project will increase suitable habitat for a variety of wildlife species including pollinating insects, nesting birds, and small mammals.

The Project Area will be enclosed with a fence to keep larger wildlife out of the solar panel area. MNDNR recommendations for fence height are being considered. The perimeter fence may exclude some large mammals from entering the Project Area; most small mammals, birds, reptiles and amphibians will still be able to access this area, whether through, under, or over the fence. Large mammals, such as white-tailed deer, will have the ability to pass through the Project Area in between PV array areas and will not be impeded by the Project's fencing. There will be wide corridors between fenced areas throughout the Project Area and most wetlands and waterways will be located outside of the fenced area (Appendix B, Maps 3 and 4). The arrangement of the fenced areas of the Project array relative to existing roads and utilities provide various pathways through the Project Area which would allow wildlife to cross. Screening will be added around portions of the Project Area, generally in areas between adjacent residences and the Project Area that currently lack screening. Screening will consist of live vegetation, primarily trees and shrubs; this screening will provide additional habitat and shelter for wildlife species.

5.6.8 RARE AND UNIQUE NATURAL RESOURCES

To evaluate the site for potential occurrences of threatened and endangered species and unique natural resources, the following databases were reviewed: the USFWS IPaC System which summarizes the federally listed species with the potential to occur within the Project Area; and the MNDNR's NHIS and Minnesota Conservation Explorer online map tool which document occurrences of state listed species, species of concern and rare habitat. The Project was submitted to MNDNR for a Natural Heritage Review on August 29, 2024.

These reviews do not represent a comprehensive survey but provide information on the potential presence of protected species and habitat within the vicinity of the Project. A site visit to perform a habitat assessment was conducted concurrently with the wetland delineation on October 17-21, 2022 and October 11-12, 2023 to determine if suitable habitat for listed species identified by IPaC or NHIS was present.

5.6.8.1 Federally Listed Species

Based on the IPaC review there were one federally listed endangered species, rusty-patched bumble bee (*Bombus affinis*); two proposed threatened species, the monarch butterfly (*Danaus plexippus*) and western regal fritillary (*Argynnis idalia occidentalis*); and one experimental population/non-essential population, whooping crane (*Grus americana*), that have the potential to occur near the site (Table 29). No designated critical habitats occur within the Project Area. However, the USFWS (2018b) adapted a habitat connectivity model for the rusty-patched bumble bee (RPBB), to identify the zones around recent (2007-2017) records. The model produces discrete zones where there is a potential for the species to be present. The zones are referred to as High Potential Zones or Low Potential Zones. High Potential Zones contain extant sites and the surrounding area and are considered to have greatest potential for species presence. Low Potential Zones include Primary Dispersal Zones, which models the maximum dispersal potential of the species from sites with recent records surrounding High Potential Zones, which assumes the presence of species where suitable habitat is present. USFWS mapped High Potential Zones and Low Potential Zones for the RPBB are present throughout the Project Area and extend through the one-mile buffer surrounding the Project Area. Results from IPaC are provided in Appendix C.

Migratory birds are protected under the MBTA and bald and golden eagles are protected under the BGEPA. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by USFWS. The USFWS is responsible under the MBTA for proactively preventing the mortality of migratory birds whenever possible and encourage implementing measures that minimize potential impacts to migratory birds. Recommendations include clearing forested habitat outside the nesting season, which is generally March 1 to August 31, and conducting nest surveys prior to clearing to avoid injury to eggs or nestlings. The USFWS Ecological Services Field Office located in Bloomington, Minnesota is the regional office responsible for project reviews regarding migratory bird species in Dakota County.

A search of the USFWS IPaC indicated that 14 migratory bird species of conservation concern may be found in the vicinity of the Project Area, including the bald eagle (Appendix C). Migratory birds are classified as “birds of conservation concern” under the 1988 amendment to the Fish and Wildlife Conservation Act. This act mandates the USFWS to “identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973.”

5.6.8.2 State Listed Species

Using the MNDNR NHIS (MNDNR 2024e), Stantec determined the potential occurrence of state-listed threatened and endangered species within the Project Area and a one-mile buffer. No state-listed species were identified within the Project Area. One state-listed endangered species, loggerhead shrike (*Lanius ludovicianus*); one state-listed threatened species, big tick trefoil (*Desmodium cuspidatum var. longifolium*); one species of special concern, American ginseng (*Panax quinquefolium*); and one species on the watchlist, rusty-patched bumble bee, have been reported within one mile of the Project Area. The MNDNR provided Natural Heritage Review of the Project (MCE2024-00760) on October 23, 2024, and is included in Appendix C.

Table 29 presents federal and state protected species based on review of the MNDNR NHIS. The MNDNR NHIS provides the known location of protected species, therefore, Table 29 includes two columns which identify whether the NHIS record occurs within the Project Area or within the one-mile buffer of the Project Area. Table 29 also includes federally protected species identified via the USFWS IPaC. The USFWS IPaC provides a list of species that may occur within the vicinity of the Project and does not provide whether the species has a known record of occurrence within the Project Area or a one-mile buffer of the Project Area.

Table 29: Species Potentially Occurring within the Project Area or within 1 Mile

Common Name	Scientific Name	Habitat	NHIS Records Located:		State	Federal
			Within 1 Mile*	Within Project Area*		
Birds						
Loggerhead Shrike	*Lanius ludovicianus*	Uplands, native and non-native grasslands, oak savannah, pastures, old fields, and agricultural areas with short grass vegetation with perching hedge rows, shrubs, and small trees.	Yes	No	SE	---
Whooping Crane	*Grus americana*	Inland marshes, lakes, open ponds, upland swales, wet meadows and rivers, pastures and agricultural fields.	Based on IPaC List No NHIS Record	Based on IPaC List No NHIS Record	---	Experimental Population, Non- Essential
Plants						
American Ginseng	*Panax quinquefolium*	Grows only in well-developed forest soil, typically mesic loamy soil. Does not tolerate habitats that are seasonally flooded, such as what might be found around a stream, river, or the edge of a marsh.	Yes	No	SC	---
Big Tick Trefoil	*Desmodium cuspidatum var. longifolium*	Very closely associated with mesic hardwood forests, particularly the type dominated by Quercus species, Acer saccharum, and Tilia americana. Within such habitats, it appears to be rather mobile, seeking out small canopy gaps or temporary edges where there is filtered sunlight rather than continual shade.	Yes	No	ST	---
Insects						
Rusty-patched Bumble Bee	*Bombus affinis*	Has been observed in a variety of habitats including forests, prairies, wetlands, agricultural fields, and residential lawns and parks.	Yes	No	State Watchlist	FE
Monarch Butterfly	*Danaus Plexippus*	Breeds in patches of milkweed in North America and migrates to overwintering site in Canada and Mexico. During breeding and migration, they require a diversity of blooming nectar resources, which they feed on throughout their migration routes and breeding grounds (spring through fall).	Based on IPaC List, No NHIS Record	Based on IPaC List, No NHIS Record	---	Proposed Threatened
Western Regal Fritillary	*Argynnis idalia occidentalis*	Strongly associated with native prairie habitat. Adults are encountered in both upland	Based on IPaC List, No NHIS	Based on IPaC List, No	SC	Proposed Threatened

Common Name	Scientific Name	Habitat	NHIS Records Located:		State	Federal
			Within 1 Mile*	Within Project Area*		
		prairies and in wet prairies, although larval development may be restricted to upland prairie.	Record	NHIS Record		

FE = Federally listed endangered; FT = Federally listed threatened; C = Federal candidate for listing; SE = State listed endangered; ST = State listed threatened; SC = State special concern
Source: MNDNR 2024e, USFWS 2024.
*Species were identified by NHIS records as occurring either within the Project Area or within one mile of the Project Area. This generally does not apply to federally listed species which are identified by IPaC at a county level with the exception of species which are also state listed and thus may appear in NHIS records as well.

Impacts and Mitigation

Due to the wide variety of habitats that the RPBB uses, the Project Area likely contains some suitable habitat. However, much of the Project Area is currently heavily farmed and likely utilize herbicides to reduce weeds including flowering forbs and other nectar sources utilized by the RPBB. The low growing native plant mix utilized underneath the solar panels would include many forb species and other forbs would likely grow around the margins of the site which could be utilized by the RPBB. As a result, the Project would likely result in improved habitat for the RPBB.

The monarch butterfly requires milkweed plants for breeding. The Project Area is largely cultivated cropland and no large patches of milkweed were observed within the Project Area, as a result, there is likely little monarch habitat currently present and no impact to the monarch butterfly is anticipated during construction. Current farming practices likely utilize herbicides to reduce weeds, repressing the growth of milkweed species and other forbs utilized by monarchs. The low growing native plant mix utilized underneath the solar panels would include shorter forb species, providing nectar sources for monarchs. Milkweed and additional forbs would likely grow around the margins of the site following the cessation of heavy herbicide use which could be utilized by monarchs. The Project would likely result in improved habitat for the monarch butterfly.

The western regal fritillary is strongly associated with native prairie habitat. The Project Area is largely cultivated cropland and no native prairie habitat is present within the Project Area, therefore, no impact to the western regal fritillary is anticipated.

A verification letter for the Project for specified threatened and endangered species that may occur in Project locations consistent with the Minnesota-Wisconsin Endangered Species Determination Key was provided by the USFWS on January 14, 2025, and is provided in Appendix C. The USFWS determination key is intended to assist the user in evaluating the effects of their actions on Federally listed species in Minnesota. Based on the answers provided, which are included in the letter provided by the USFWS, and the assistance of the Service's Minnesota-Wisconsin DKey, the following effect determinations were made: Monarch butterfly, Rusty Patched Bumble Bee, and Whooping Crane, No effect. Accordingly, the Project is not anticipated to impact these species.

The nesting season for migratory birds is generally March 1 to August 31. Construction during this timeframe could result in short-term disturbance of migratory bird habitat, causing birds present in the Project Area to relocate temporarily during periods of active construction and human activity. The proposed Project has the potential to alter or otherwise affect migratory bird foraging habitat temporarily; however, such impacts will be minimal, given the amount of similar habitats available outside of the Project Area. Once construction is complete, the area will be revegetated with permanent, perennial herbaceous cover.

In order to avoid the potential for impacts on migratory birds, Castle Rock Solar will attempt to initiate construction prior to the primary nesting season of May 15 through August 1. If construction cannot commence prior to the primary nesting season, Castle Rock Solar will inspect construction areas not more than three days prior to construction for the presence of active bird nests. If an active bird nest is observed, Castle Rock Solar proposes to voluntarily suspend ground disturbing activities (e.g., grading, trenching) within 100 feet of the nest while the MNDNR and USFWS are contacted to determine necessary avoidance or mitigation measures, such as workspace buffering, prior to continuing ground-disturbing activities in the vicinity of an active nest. No raptor, bald eagle, or golden eagle nests were observed within or adjacent to the Project Area during habitat assessment. Castle Rock Solar proposes to conduct raptor surveys prior to construction as part of the migratory bird nest inspections described above. If active nests are observed, Castle Rock Solar will voluntarily suspend ground-disturbing activities (e.g., grading, trenching) within 0.25 mile of the nest while the USFWS is contacted to determine any necessary avoidance or mitigation measures, such as workspace buffering, prior to continuing ground-disturbing activities in the vicinity of an active nest.

The MNDNR NHIS identified no state listed species within the Project Area, though four state listed species were identified within one mile of the Project Area: one endangered, one threatened, one special concern and one watchlist species.

RPBB, the watchlist species, is discussed above with the federally listed species. The MNDNR recommends reseeding disturbed soils with native species of grasses and forbs using BWSR Seed Mixes or MnDOT Seed Mixes to minimize impacts to the RPBB.

Loggerhead shrikes prefer short to medium height grasslands including pastures, dry old fields, grassland shrub, dry-mesic prairie, oak savannah, and orchards. Shrubs and/or low trees (usually thorny) are required for nesting and perching. Once considered a common inhabitant of grassland habitats, the loggerhead shrike population in Minnesota has fallen sharply, and the species is currently very rare or absent throughout much of its former range. In the last 25 years, loggerhead shrikes have consistently been found in only two counties: Dakota County and Clay County with occasional scattered observations from other counties. During the Minnesota Breeding Bird Atlas (2024) surveys from 2009 – 2013, confirmed breeding was documented in only seven counties; and nearly half the observations were in Dakota County.

The Project Area contains habitat which may provide the open space and nesting sites needed by the loggerhead shrike. The species has been observed near the Project Area on multiple occasions. The Project may increase habitat available for shrikes, as they prefer short to medium height grasslands, and the native vegetation which will be planted under the solar arrays will be short to medium height species. Avoidance of impact to this species would be consistent with those described for the MBTA. The MNDNR Natural Heritage Review provided that if tree and shrub removal is required for the Project, that clearing is

not conducted during the breeding season for the loggerhead shrike (April through July). Castle Rock Solar has committed to not conduct tree and shrub clearing during this time.

American ginseng and big tick trefoil have low to no potential habitat within the Project Area. American ginseng and big tick trefoil prefer closed canopy, mature forests and are not found in areas with seasonal flooding, such as along marshes, streams, or rivers. Woodlands within the Project Area are either associated with the floodplain of the South Branch Vermillion River or are small, isolated areas along the margins of farm fields. No mature, mesic, forested areas are located within the Project Area, therefore, suitable habitat for the American ginseng and big tick trefoil is not found within the Project Area and the species will not be impacted by the Project.

The NHIS tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Even if there are no bat records listed nearby, all of Minnesota's bats, including the federally endangered northern long-eared bat (*Myotis septentrionalis*), can be found throughout Minnesota. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, the MNDNR recommended that tree removal be avoided from June 1 through August 15.

5.6.8.3 Wildlife Action Network and Minnesota Wildlife Action Plan Species

The Wildlife Action Network is comprised of areas with high concentrations of persistent or viable populations of Species of Greatest Conservation Need (SGCN). SGCN are defined as native species with rare, declining, or vulnerable populations and species for which the state has a stewardship responsibility. The Minnesota State Wildlife Action Plan (2015-2025) proactively addresses the state's conservation needs and catalyzes actions in an attempt to prevent species from needing to be listed under the state's endangered species law (MNDNR 2024g). No SGCN were documented within the Project Area based on the MNDNR NHIS ER response (ERBD #20200305).

5.6.8.4 Wildlife Action Network and Minnesota Wildlife Action Plan Habitat

One of the strategies used by the WAP is to sustain and enhance terrestrial and aquatic habitats so they can better support SGCN (MNDNR 2016). The Wildlife Action Network is composed of terrestrial and aquatic habitat areas and corridors which support biological diversity and ecosystem resilience with a focus on supporting SGCN. The network is used to target conservation work to improve habitat, promote conservation of the SGCN and reduce one of the primary causes of populations declines (MNDNR 2024g).

MNDNR High Value Habitats

The MNDNR Commercial Solar Siting Guidance identifies types of high value natural resources that should be identified so impacts to the resources can be avoided (MNDNR revised 2023). High value habitats identified by the guidance include:

1. MBS Sites of Biodiversity Significance
2. MNDNR Native Plant Communities

3. Native Prairie
4. Lakes, wetlands, calcareous fens, streams, and rivers, including Lakes of Biological Significance and streams with exceptional indices of biological integrity
5. Public land, including recreation land and public conservation areas (ex. WMAs, SNAs, etc.)
6. Large block habitats (greater than 40 acres)
7. Land protected by conservation easements or enrolled in government conservation programs

High value natural resources are shown in Appendix B, Maps 5, 8, 11, and 14.

MBS Sites of Biodiversity Significance

Sites of biodiversity significance are areas that are ranked based on the presence of rare species populations, the size and condition of native plant communities within the site, and the landscape context of the site. There are four biodiversity significance ranks, outstanding, high, moderate and below (MNDNR 2024h). Outstanding sites contain the best occurrences of the rarest species, rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes. High ranked sites contain very good quality occurrences of the rarest species, high quality rare native plant communities, and/or important functional landscapes. Moderate sites contain rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for the recovery of native plant communities and characteristic ecological processes. Below sites lack occurrences of rare species and natural features or do not meet standards for outstanding, high, or moderate rank.

One MNDNR mapped Site of Biological Significance (SBS) is located within the Project Area south of 230th Street West (Appendix B, Map 14). MNDNR assessed the area as a good quality wet meadow dominated by lake sedge (*Carex lacustris*) and bluejoint grass (*Calamagrostis canadensis*), though the site was ranked as Moderate. MNDNR records indicate that past grazing and mowing may have reduced species diversity and plowed fields adjacent to the wet meadow affect runoff. Stantec field surveys conducted October 17-21, 2022, found the area to now be dominated by reed canary grass (*Phalaris arundinacea*) and hybrid cattail (*Typha x glauca*) with only small pockets of tussock sedge (*Carex stricta*), prairie cordgrass (*Spartina pectinata*), and red-osier dogwood (*Cornus sericea*).

Two additional SBS are located within one mile of the Project Area (Appendix B, Map 5 and 14). One SBS ranked as Outstanding is located 0.40 mile east of the Project Area and partially overlaps with the Hampton Woods WMA. The second SBS is located 0.95 mile south of the Project Area and is ranked as Below.

Native Plant Communities

The MNDNR describes NPCs as a group of native plants that are not greatly altered by modern human activity or by introduced organisms (i.e., non-native species). NPCs are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes including wildfires and floods (MNDNR 2024i). There is one NPC mapped within the Project Area and three NPCs mapped within one mile of the Solar Facility (Appendix B, Maps 5 and 14). The NPC within the Project Area is a wet meadow/carr system classified as WMn82b sedge meadow. The NPCs within a one-mile radius were wet/meadow carr systems (WMn82a Willow-dogwood shrub swamp and WMn82b sedge meadow), and mesic hardwood forest (MHs38c Red oak – sugar maple – basswood forest) (Appendix B, Map 5).

Native Prairie

Native prairie is a grassland community with a diversity of forbs and once covered much of the southern portion of Minnesota. Less than one percent of Minnesota's original prairie remains, as much of the prairie was plowed under to support farming (MNDNR 2023a). There is no remnant native prairie present within the Project Area.

Lakes, wetlands, calcareous fens, rivers, streams

Water resources, including lakes, wetlands, streams, and rivers are discussed in Section 5.6.5 and shown in Appendix B, Maps 11a and 11b. There is one Public Waterway, South Branch Vermillion River (M-049-005) which crosses through the Project Area. Additionally, there are 22 field delineated wetlands; six waterways, including the South Branch Vermillion River; and one open water feature. Additional details regarding the water resources can be found in the wetland delineation report in Appendix K.

No calcareous fens, lakes of biological significance, Outstanding Resource Value Waters, or streams with exceptional indices of biological integrity were present within the Project Area or within a one-mile radius.

Public Land

Public conservation and recreation lands include lands administered by federal, state, or local agencies, or conservation easements. There is no public land including recreation or public conservation areas (ex. WMAs, SNAs, etc.) located within the Project Area (Appendix B, Map 8). Hampton Woods WMA is located 0.75 mile east of the Project Area and is the closest WMA (Appendix B, Map 5). The Vermillion River WMA and Vermillion River (Dakota) AMA are located 2.25 miles north of the Project Area and the South Branch Vermillion River AMA is located 2.80 miles northeast.

Large Block and Other Important Habitats

Large block habitats are grassland or woodland areas of greater than 40 acres (MNDNR revised 2023). Land cover within the Project Area has largely been modified for anthropogenic purposes (Appendix B, Map 9). There are no large block grassland or forest habitats within the Project Area. There is large block wetland habitat associated with the wetland complexes surrounding the Vermillion River.

Protected Land

Based on the MNDNR (2023) Solar Guidance, protected land includes land protected by conservation easements or enrolled in government conservation programs including MNDNR Native Prairie Bank, RIM, Forest Legacy easements, and USFWS or private conservation easements. There are no Native Prairie Bank, Forest Legacy, or CRP lands located within the Project Area. There are two properties within one mile of the Project which are participating in the NRCS Farm and Ranch Lands Protection Program (FRPP) and are adjacent to the northeast portion of the Project (Appendix B, Map 5). There are no other known properties in government programs or with conservation easements in the Project Area or one-mile buffer.

Impacts and Mitigation

Many wetlands and waterways will be avoided. The BMPs described in Section 5.6.5 will be used to minimize impacts to the wetlands and watercourses within the Project Area. BMPs described in Section

5.6.5 will be used to minimize impacts to the NPCs and MBS SBS identified within the Project Area as they also correspond with wetlands, including avoiding the communities and boring collection lines underground where they cross the NPCs and MBS SBS. As such, permanent impacts to MNDNR High Value Habitats will be avoided and no mitigation measures are proposed.

No CRP lands will be impacted by the anticipated Development Area. No large block habitats or public conservation lands are located within the Project Area; therefore, no impacts are anticipated. Regardless, the Applicant will implement a VMP that includes minimizing chemical use in sensitive areas by avoiding broadcast applications of herbicide and employing spot treatments for control of invasive species.

MBS Sites of Biodiversity Significance

Stantec field surveys conducted in October 2022, found the SBS area to now be dominated by reed canary grass and hybrid cattail with only small pockets of tussock sedge, prairie cordgrass, and red-osier dogwood. The SBS also corresponds with a FEMA floodplain and mapped wetlands, as a result, the solar panels will be located outside of the SBS. The only Project infrastructure that will cross through the SBS are two collection lines which will be bored underneath or span over the wetland, thereby not impacting the SBS.

Two additional SBS are located within one mile of the Project Area (Appendix B, Map 14) and are not anticipated to be impacted by the Project.

The MNDNR Natural Heritage Review for the Project recommends that the Project be designed to avoid impacts to these ecologically significant areas. Actions to avoid or minimize disturbance include, but are not limited to, the following recommendations:

- As much as possible, operate within already-disturbed areas.
- Avoid MBS Sites and native plant communities ranked S1, S2, or S3.
- Retain a buffer between proposed activities and the MBS Site.
- Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities).
- Do not park equipment or stockpile supplies in the MBS Site.
- Do not place spoil in the MBS Site or other sensitive areas.
- Use effective erosion prevention and sediment control measures.
- Inspect and clean equipment prior to operation and follow recommendations to prevent the spread of invasive species.
- Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible.

- Use only weed-free mulches, topsoil, and seed mixes. Of particular concern are birdsfoot trefoil (*Lotus corniculatus*) and crown vetch (*Coronilla varia*), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

MNDNR Native Plant Communities (NPC)

As discussed above, the area will be avoided and the collection lines that cross the NPC will be bored underground or aerial spanned to avoid disturbing the NPC. The NPCs within a one-mile radius outside of the Project Area will not be impacted by the Project.

Native Prairie

There is no remnant native prairie present within the Project Area, therefore the Project will not impact existing native prairie. However, the Project will be seeding a variety of low-growing native prairie plant species underneath the solar arrays, thus increasing native prairie habitat in the area.

Lakes, wetlands, calcareous fens, streams, and rivers, including Lakes of Biological Significance and streams with exceptional indices of biological integrity

The Project is designed to avoid and minimize impacts to wetlands and watercourses as much as possible. Wetlands have been avoided to the extent practicable and the majority of wetlands and waterways will be avoided but due to the size and configuration of the Project, wetland impacts are not completely avoidable. Impacts are discussed in Section 5.6.5.1, detailed in Table 28 and shown in Appendix B, Maps 4a, 4b, 11a and 11b. The Project facilities that will require waterway crossings include access roads and the collection system. Other Project facilities, such as the panels and associated facilities and the substation, will not impact waterways. The proposed waterway crossings are necessary to meet the locational and constructability requirements of the Project. The wetlands within the Project Area are mostly comprised of non-forested communities, including degraded wet meadows and shrub-carr wetlands. Many of these wetlands have been impacted over time by intensive farming activities and drainage manipulation. These wetlands are generally of lower-quality and dominated by invasive or non-native species. The forested wetlands within the Project Area include floodplain forest and hardwood swamps and are either small, isolated communities or are associated with the Vermillion River South Branch wetland complex corridor and are generally avoided.

Water quality in waterways in the Project Area, as well as waterways downstream should ultimately improve as areas that are currently being farmed with conventional row crop agriculture will be planted with perennial cover consisting of native plant species. The native species should reduce runoff, erosion, and improve soil health, thus improving water quality in adjacent waterways. BMPs will be used during construction to prevent erosion from impairing water quality in waterways and wetlands. Wetlands that are temporarily impacted during construction will be restored following the completion of construction and since many of the wetlands are currently degraded, reseeding in the wetlands following construction will likely improve the quality of vegetation in the wetlands.

Additional details regarding the water resources can be found in Section 5.6.5.

No calcareous fens, lakes of biological significance, Outstanding Resource Value Waters, or streams with exceptional indices of biological integrity were present within the Project Area or within a one-mile radius and thus will not be impacted by the Project.

Public land, including recreation land and public conservation areas (ex. WMAs, SNAs, etc.)

There is no public land including recreation or public conservation areas (ex. WMAs, SNAs, etc.) located within the Project Area (Appendix B, Map 8). Hampton Woods WMA is located 0.75 mile east of the Project Area and is the closest WMA (Appendix B, Map 5). The Project is not anticipated to impact public land.

Large block habitats (greater than 40 acres)

Land cover within the Project Area has largely been modified for anthropogenic purposes and there are no large block grassland or forest habitats within the Project Area. There is large block wetland habitat associated with the wetland complexes surrounding the Vermillion River South Branch. However, the Vermillion River wetland complex has been excluded from the Project Development Area. The only infrastructure crossing through the complex will be two collection lines which will be either bored underground or aerially spanned, avoiding impacts to the habitat.

Land protected by conservation easements or enrolled in government conservation programs

There are no Native Prairie Bank, Forest Legacy, or CRP lands located within the Project Area. There are two properties within one mile of the Project which are participating in the NRCS FRPP and are adjacent to the northeast portion of the Project (Appendix B, Map 5). There are no other known properties in government programs or with conservation easements in the Project Area or one-mile buffer. The Project is not anticipated to impact land protected by conservation easements.

5.7 CUMULATIVE POTENTIAL IMPACTS

Cumulative potential effects result when impacts associated with the proposed Project are combined with impacts associated with past, present, or reasonably foreseeable future actions within the area affected by the proposed Project. No information regarding plans for other solar or infrastructure projects near the Project Area were identified during the coordination or outreach activities. Also, as stated in Section 3.3, there are no future plans to expand the Project.

A review of the Metro District MnDOT highway projects identified two planned MnDOT projects for Dakota County (Table 30). However, these planned projects are not near the Project Area and are not expected to create significant cumulative impacts with the Project.

Table 30: Dakota County Transportation Projects

Agency	Planned Construction Start	Description
MnDOT	Summer 2022 through fall 2024	Hwy 52 is reduced to one lane in both directions between Hwy 50 in Hampton and Co. Rd. 86 north of Cannon Falls. Travel will occur on southbound lands with head-to-head traffic through June. Then traffic will shift to travel on the northbound lanes with head-to-head traffic through late August. Side streets and driveways will only be accessible using a right in and right out. Co. Rd 86 ramp to NB Hwy 52 is closed. Detour Hwy 19, Hwy 56 and Hwy 50.
	June through September 2025.	In 2025, a roundabout will be constructed at the intersection of Hwy 3 and 142nd St. to improve safety, reduce delays, and enhance the overall operations at the entrance to the Rosemount High School. In addition to adding the roundabout, crews will also be adding drainage and re-aligning the bike/pedestrian crosswalks to include pedestrian access at the roundabout.
	February 2021 through May 2024	MnDOT is evaluating Hwy 3 between 160 St. in Rosemount and 2nd St. in Farmington to identify possible safety improvements for motorists, pedestrians, and bicyclists. The evaluation will help develop a plan to serve as guidance for the County, Cities, MnDOT, Metropolitan Council, landowners, and developers on desired changes to access and future access locations on Hwy 3. This can be achieved by seeking public feedback that will take into consideration how the highway works in the regional road network, the planned growth of the community, and the need for an adequate supporting road network to support development.

Impacts and Mitigation

No other planned projects have been identified near the Project Area, and no mitigation is proposed.

5.8 UNAVOIDABLE IMPACTS

The Project has been sited and designed to minimize impacts to the natural environment to the degree possible and practicable. However, with all construction projects, natural environmental impacts are not completely avoidable.

Primary unavoidable temporary impacts expected during construction include:

- Noise
- Dust
- Construction related traffic
- Wildlife displacement
- Potential soil erosion from exposed soils

Primary unavoidable impacts expected for the life of the project include:

- Aesthetic changes to the landscape

- Land use change from agricultural to solar panels
- Infrequent operations and maintenance traffic
- Re-routing of Snowmobile Trail 123

The Project will require only minimal commitments of resources that are irreversible and irretrievable. Irreversible and irretrievable resource commitments that are necessary for the Project are primarily related to construction, including the use of water, steel, and concrete and other consumable resources. Some materials used for the Project might be recyclable in part; for example, the raw materials used to construct PV panels would be an irretrievable commitment of resources, excluding those materials that may be recycled at the end of the panels' useful life.

Impacts and Mitigation

Unavoidable impacts will be mitigated through the SWPPP, SPCC, VMP, AIMP, and decommissioning plan. No other mitigation measures are proposed.

5.9 CLIMATE CHANGE

In 2019, the Governor's Advisory Counsil and Climate Change Subcabinet was created by Executive Order 19-37 (EO 19-37, 2019), to coordinate climate change mitigation and resilience strategies in the State of Minnesota. EO 19-37 states that climate change is an existential threat that impacts all Minnesotans and encourages State leaders and policy makers to consider equity in our States response to climate change (Minnesota EO 19-37, 2019).

The Next Generation Energy Act (NGEA) set statutory goals to reduce greenhouse gas emissions in the state by 30 percent of 2005 levels by 2025 and 80 percent by 2050. Minnesota did not meet the 2015 goal of 15 percent and is not on track to meet the 2025 goal. The EO 19-37 called for a redoubling of efforts to meet or exceed the NGEA goals (MN Exec. Order No, 19-37, 2019).

In 2023, Governor Walz signed the Clean Energy Law which establishes both a carbon-free energy standard and a renewable energy standard (EESI 2023). The carbon-free standard requires electrical utilities to achieve 80 percent carbon-free energy by 2030 and 100 percent by 2040. The renewable energy standard requires that 55 percent of the energy sold to Minnesota customers by electrical utilities come from renewable sources by 2035.

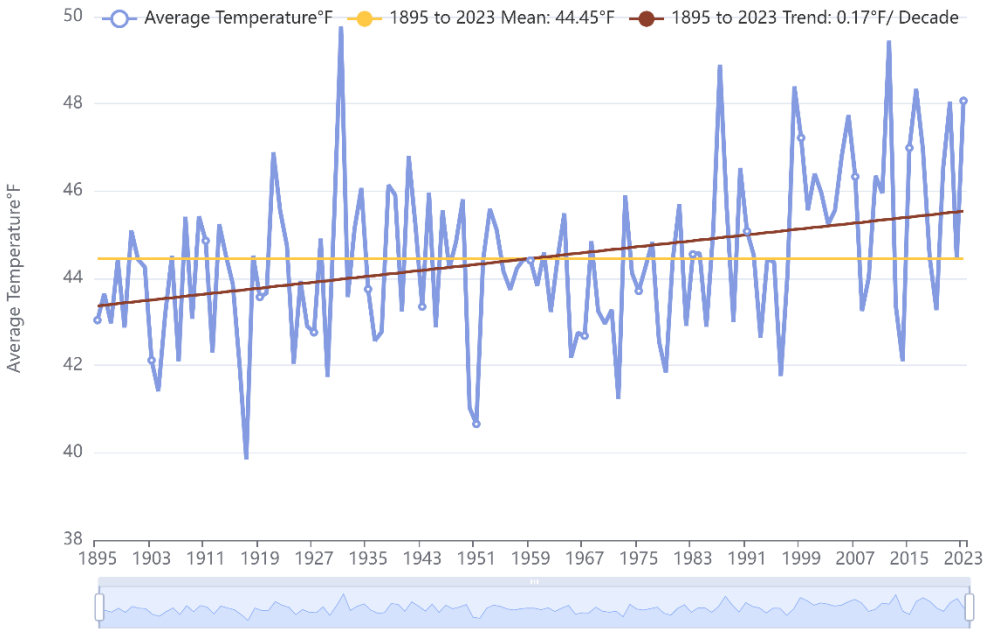
The Project will further the States' clean energy goals by providing a renewable source of energy that will offset other greenhouse gas emissions, primarily from coal and natural gas. The Project is expected to offset approximately 134,000 metric tons of carbon dioxide equivalent (CO_{2e}) annually and provide electricity for approximately 20,750 homes annually. Further, the Project has been designed with resiliency in mind as climate continues to change in Minnesota. Project equipment will be carefully engineered and selected to withstand the potential for an increase in the frequency of severe weather events.

In general, Minnesota is anticipated to experience an increase in temperature, precipitation, and more frequent extreme precipitation events resulting from climate change. In Minnesota, annual average temperatures have risen two degrees over the past century and up to three degrees in the northern part of

the state. The highest average temperature increases have occurred during the winter. Since 1895, temperatures during the winter have increased at a rate two to three times higher than during the summer. In particular, winter warming rates have risen more sharply in recent decades. Current climate warming trends, most notably during the winter, are anticipated to continue.

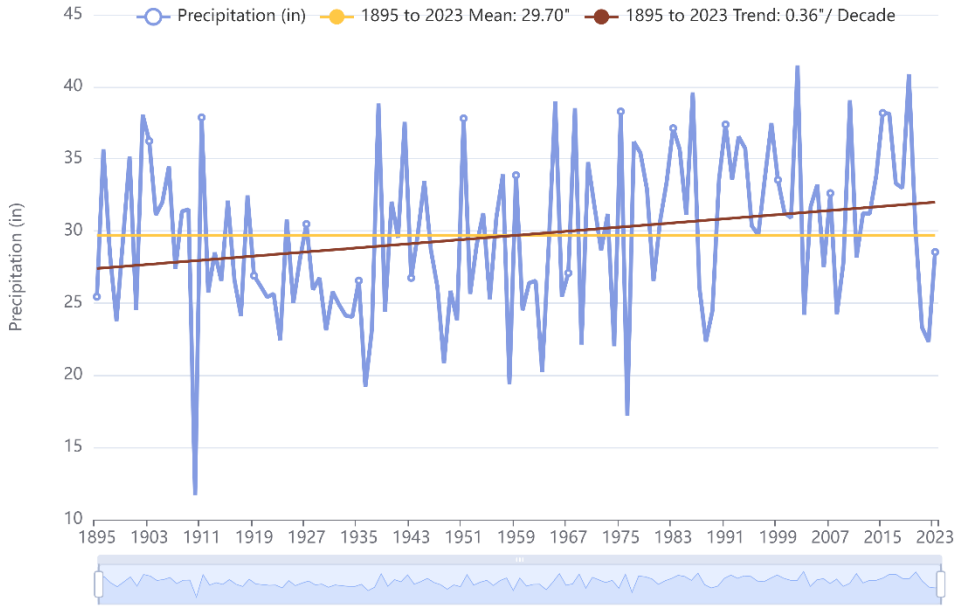
Heavy rain events have become more frequent in Minnesota and more intense. From 1973 to 2020, Minnesota experienced 17 mega-rain events with a notable increase since 2000. Of these 17 events, three occurred in the 1970s, two in the 1980s, one in the 1990s, six mega-rain events occurred in the 2000s, four in the 2010s, and one in 2020. Thus, in the past 21 years (2000 to 2020), almost two times as many mega rain events occurred compared to the prior 27 years (1973 to 1999).

Climate trends in Dakota County parallel the overall statewide trends, indicating Minnesota's climate is becoming warmer and wetter. **Figure 14** and **Figure 15** illustrate historical average annual temperature and precipitation trends from 1895 to 2023, respectively. During this time period, the County experienced an average annual temperature increase of 0.17 degrees Fahrenheit (°F) per decade and an annual precipitation increase of 0.36 inches per decade.



Source: DNR. https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical

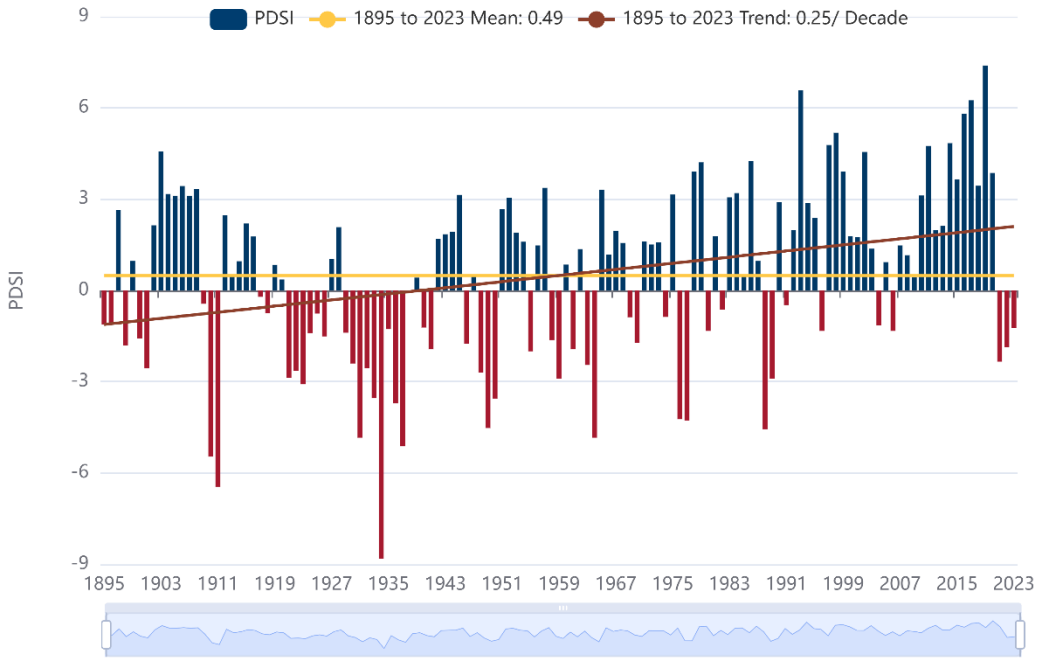
Figure 14. Historical Annual Average Temperature in Dakota County (1895 – 2023)



Source: DNR. https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical

Figure 15. Historical Annual Average Precipitation in Dakota County (1895 – 2023)

The Palmer Drought Severity Index (PDSI) utilizes temperature and precipitation data to estimate relative soil moisture conditions and serve as an indicator of long-term drought conditions. The index ranges from -5 to +5 indicating dry and wet conditions, respectively. PDSI values are reported on a monthly basis. Figure 16 shows historic PDSI values for the month of August from 1895 to 2023 for Dakota County, which indicates an increase of 0.25 per decade. Generally, the PDSI historical data indicates that the region is experiencing a wetter climate.

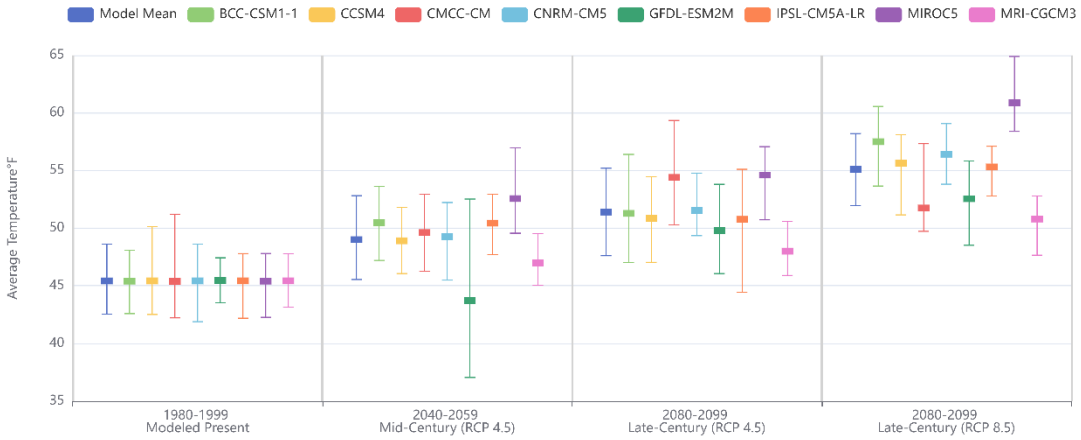


Source: DNR. https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical

Figure 16. Historical PDSI Values for Dakota County (1895 – 2023)

Projected climate trends indicate that temperatures within the County will continue to increase. **Figure 17** illustrates projected temperatures for the County. Several climate models are shown in the projected temperature analysis. The model mean, shown in blue, illustrates the average of all models included in the analysis. Figure 17 shows the modeled present condition, mid-century (2040-2059) at Representative Concentration Pathway (RCP) 4.5, late-century (2080-2099) at RCP 4.5, and late-century (2080-2099) at RCP 8.5. RCP is a greenhouse gas concentration scenario used by the Intergovernmental Panel on Climate Change in the fifth assessment report. RCP 4.5 is an intermediate scenario in which emissions decline after peaking around 2040 and RCP 8.5 represents a worst-case scenario in which emissions continue rising through the 21st century.

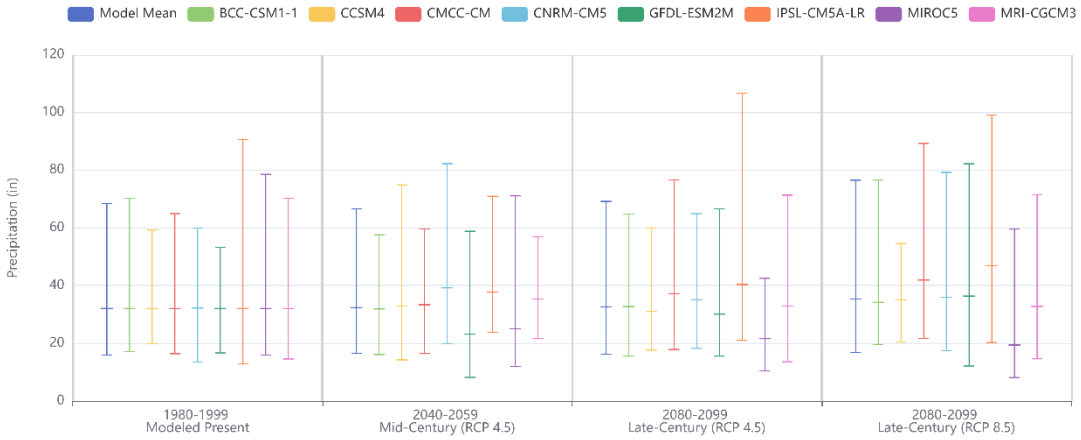
Under the RCP 4.5 scenario, the annual temperature is anticipated to increase within the County from a modeled present mean of 45.4°F (1980-1999) to a mid-century (2040-2059) model mean of 49.0°F and a late-century (2080-2099) model mean of 51.4°F. Under the RCP 8.5 worst-case scenario, the County will experience a late-century (2080-2099) model mean temperature of 55.1°F.



Source: DNR. https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical

Figure 17. Projected Temperatures in Dakota County

Figure 18 presents projected average annual precipitation for Dakota County. Under the RCP 4.5 scenario, the annual precipitation is anticipated to increase within the County from a modeled present mean of 32.0 inches (1980-1999) to a mid-century (2040-2059) model mean of 32.3 inches and a late-century (2080-2099) model mean of 32.6 inches. Under the RCP 8.5 worst-case scenario, the County will experience a late-century (2080-2099) model mean precipitation of 35.3 inches. In comparison to the modeled present mean (1980-1999), the late-century (2080-2099) modeled mean annual precipitation will increase by approximately 1.9 percent under the RCP 4.5 scenario and increase by approximately 9.8 percent under the RCP 8.5 scenario.



Source: DNR. https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical

Figure 18. Projected Precipitation in Dakota County

Impacts and Mitigation

The Castle Rock Solar Project is expected to produce beneficial climate change effects.

To help address soil impacts and increased stormwater runoff and potential flooding risk during heavy rain events, Castle Rock Solar is committed to minimizing impacts to soil within the Project Area so that the site may be returned to active agricultural production upon decommissioning.

In accordance with the project's vegetation management plan, Castle Rock Solar will establish a permanent vegetative cover throughout the Project Area including areas beneath and around arrays. This will manage erosion by increasing stormwater infiltration and reducing runoff. Stormwater infiltrates soil at a higher rate on perennially vegetated ground cover than on cultivated cropland. The transition to permanent perennial vegetation will manage runoff resulting from the solar modules and access roads. Permanent perennial vegetative cover also provides connectivity to existing adjacent wildlife habitats.

Placing electronic components in areas behind solar panels can reduce the effects of extreme heat.

6 AGENCY AND STAKEHOLDER COORDINATION

Table 31: Summary of Agency Correspondence

Agency	Response Date and Summary
Federal	
USACE, St. Paul District	August 22, 2024. Applicant submitted wetland delineation report and requested concurrence on boundary and type of aquatic resources. August 27, 2024. USACE responded a delineation concurrence may not be necessary from the USACE. USACE recommends moving forward, completing the Project plans and identifying the impacts to river and wetland areas then submitting an application to their office.
USFWS, Region 3	March 14, 2024. Official Species List obtained through IPaC. September 5, 2024. Official Species List renewed through IPaC. January 14, 2025. Official Species List renewed through IPaC. January 14, 2025. A verification letter for the Project for specified threatened and endangered species that may occur in the Project location consistent with the Minnesota-Wisconsin Endangered Species Determination Key was provided by the USFWS. Based on the answers provided and the assistance of the Service's Minnesota-Wisconsin DKey, the following effect determinations were made: No Effect - Monarch Butterfly, Rusty Patched Bumble Bee, and Whooping Crane.
FAA	August 27, 2024, FAA Notification Criteria Tool was used to determine if notification is required for the Project. Results of the FAA Notification Criteria Tool determined that the Project does not exceed Notice Criteria.

Agency	Response Date and Summary
State	
SHPO	October 31, 2024, Applicant submitted *An Archaeological Reconnaissance Survey of the Castle Rock Solar Project, Dakota County, Minnesota* (October 22, 2024) and requested Project Review. October 31, 2024, Applicant submitted the *Historic Architectural Survey for the Castle Rock Solar Project, Dakota County, Minnesota* for review. December 12, 2024, SHPO provided a response that SHPO reviewed the submitted report, *An Archaeological Reconnaissance Survey of the Castle Rock Solar Project, Dakota County, Minnesota* (October 22, 2024) as prepared by Stantec. Based on the results of the survey, SHPO determined that there are no known or suspected archaeological resources that will be affected by this project. SHPO also reviewed the *Historic Architectural Survey for the Castle Rock Solar Project, Dakota County, Minnesota* (January 8, 2024) and determined that there are no properties listed in the National or State Registers of Historic Places, or within the Historic Sites Network, that will be affected by this project.
MNDNR	August 29, 2024. MDNR automated review for potential impacts to rare features (MCE #2024-00760). MNDNR Natural Heritage Review of the Project pending. October 23, 2024. MNDNR provided Natural Heritage Review of the Castle Rock Solar Project. project ID MCE2024-00760. The DNR recommends that 1.) the project be designed to avoid impacts to certain ecologically significant areas, 2.) if tree and shrub removal is required to be avoided during the migratory bird breeding season, April through July, and from June 1 through August 15 to avoid bat impacts, and 3.) reseeding disturbed soils with native species of grasses and forbs using BWSR Seed Mixes or MnDOT Seed Mixes. October 24, 2024. Met with MNDNR Energy Projects Planner; MNDNR Regional Environmental Assessment Ecologist. Applicant provided Project overview and update regarding studies completed/in progress. Discussed MNDNR communication process and agency contacts.
MnDOT	November 15, 2024. Applicant met with MnDOT to present the Project.
Minnesota Department of Agriculture	October 30, 2024. Applicant provided AIMP for review and comment.
WCA LGU	August 22, 2024. Applicant submitted wetland delineation report and requested concurrence on boundary and type of aquatic resources. August 29, 2024. LGU issued the Notice of Application October 2 and October 29, 2024. Applicant met with LGU and Technical Evaluation Panel (TEP) for field reviews of the wetland delineation. December 18, 2024. Applicant had a virtual meeting with the LGU and TEP to discuss the wetland delineation. December 26, 2024. The LGU issued the NOD approving the wetland boundaries.
Local	
Dakota County	June 12, 2024. Applicant met with Dakota County Zoning Board and Vermillion River Watershed Joint Powers Organization to present the Project.

Agency	Response Date and Summary
Castle Rock Township	February 13, 2024, December 12, 2023, May 9, 2023. Applicant attended township board meeting. Presented Project activities conducted to date.
Snowmobile Club	July-Sept 2024. Applicant attempted to contact the local snowmobile club various times.

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