# *Joint Site Permits Application to the Minnesota Public Utilities Commission for: Lake Charlotte Solar Energy Conversion Facility and Battery Energy Storage System*

**Lake Charlotte Solar, LLC**
**Martin County, Minnesota**

**Solar Facility Docket No. IP-7159/GS-25-206**
**BESS Facility Docket No. IP-7159/ESS-25-205**

**June 2025**

**8400 Normandale Lake Blvd., Suite 1200**
**Bloomington, MN 55437**

| | |
|---|---|
| **Applicant:** | Lake Charlotte Solar, LLC |
| **Address:** | 8400 Normandale Lake Blvd., Suite 1200<br>Bloomington, MN 55437 |
| **Authorized Representative:** | Marta Lasch |
| **Signature:** | Marta Lasch |
| **Phone:** | 612.259.3093 |
| **Email:** | mlasch@geronimopower.com |

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# ACRONYM LIST

| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| AC | alternating current |
| Applicant | Lake Charlotte Solar, LLC |
| ARMER | Allied Radio Matrix for Emergency Response |
| BESS | Battery Energy Storage System |
| BMP | best management practices |
| $CH_4$ | methane |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| Commission | Minnesota Public Utilities Commission |
| CR Study Area | Land Control Area and the area within a one-mile buffer |
| CREP | Conservation Reserve Enhancement Program |
| dBA | A weighted decibel |
| DC | direct current |
| DOC | Department of Commerce |
| Drainage Systems Manager | Martin County Drainage Systems Manager |
| EPA | U.S. Environmental Protection Agency |
| FAA | Federal Aviation Administration |
| gen-tie | generation tie |
| Geronimo Power | Geronimo Power, LLC |
| GIS | geographic information systems |
| GPS | Global Positioning System |
| IPaC | Information for Planning and Conservation |
| Joint Application | Joint Site Permits Application |
| kV | kilovolt |
| kV/m | kilovolt per meter |
| $L_{10}$ | noise level that may not be exceeded for more than 10 percent of any hour |
| $L_{50}$ | noise level that may not be exceeded for more than 50 percent of any hour |
| Lake Charlotte | Lake Charlotte Solar, LLC |
| Lake Charlotte Solar | Lake Charlotte Solar, LLC |
| Land Control Area | Approximately 1,277-acre area of privately-owned land for which Lake Charlotte Solar, LLC has leases and purchase options to allow siting and construction of the Project. |

| | |
|---|---|
| LIUNA | Laborers' International Union of North America |
| LGU | Local Government Unit |
| MDA | Minnesota Department of Agriculture |
| MDH | Minnesota Department of Health |
| MDNR | Minnesota Department of Natural Resources |
| MISO | Midcontinent Independent System Operator, Inc |
| MNDOT | Minnesota Department of Transportation |
| MPCA | Minnesota Pollution Control Agency |
| MW | megawatt |
| MWh | megawatt hour |
| $N_2O$ | nitrous oxide |
| NAAQS | National Ambient Air Quality Standards |
| NESC | National Electrical Safety Code |
| NFPA | National Fire Protection Association |
| NIEHS | National Institute of Environmental Health Sciences |
| NLCD | National Land Cover Database |
| $NO_2$ | nitrogen dioxide |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NSA | noise sensitive area |
| $O_3$ | ozone |
| O&M | operations and maintenance |
| Ordinance | Martin County Renewable Energy Ordinance |
| Pb | lead |
| PEM | Palustrine Emergent |
| Phase I ESA | Phase I Environmental Site Assessment |
| $PM_{10}/PM_{2.5}$ | particulate matter less than 10 microns in diameter / particulate matter less than 2.5 microns in diameter |
| POI | Point of Interconnection |
| Preliminary Development Area | An approximate 1,004-acre area that falls entirely within the Land Control Area where Lake Charlotte Solar, LLC proposes to build the Project facilities. |
| Prime Farmland Rule | Minnesota Rules 7850.4400, subp. 4 |
| Project | Lake Charlotte Solar Facility and Battery Energy Storage System |
| Project Substation | substation for the Project |
| PWI | Public Waters Inventory |
| REC | Recognized Environmental Condition |
| RNDC | Region Nine Development Commission |

| | |
|---|---|
| SMMPA | Southern Minnesota Municipal Power Agency |
| SCADA | Supervisory Control and Data Acquisition |
| SHPO | State Historic Preservation Office |
| $SO_2$ | sulfur dioxide |
| Solar Facility | Lake Charlotte Solar Facility |
| SSURGO | Soil Survey Geographic database |
| SWPPP | Stormwater Pollution Prevention Plan |
| Tetra Tech | Tetra Tech, Inc. |
| THPO | Tribal Historic Preservation Officer |
| tpy | tons per year |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USDOT | U.S. Department of Transportation |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VOC | volatile organic compound |

## Application Content Requirements Completeness Checklist

| Project Permit Application Requirements (Minn. Rules 7850.1900, Subp. 1) | Application Section |
|---|---|
| A. a statement of proposed ownership of the facility as of the day of filing and after commercial operation; | 1.2 |
| B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated; | 1.2 |
| C. at least two proposed sites for the proposed large electric power generating plant and identification of the applicant's preferred site and the reasons for preferring the site; | 3.4 |
| D. a description of the proposed large electric power generating plant and all associated facilities, including the size and type of the facility; | 2.0 and 4.1 |
| E. the environmental information required under subpart 3; | See Environmental Information below |
| F. the names of the owners of the property for each proposed site; | 1.2.2 |
| G. the engineering and operational design for the large electric power generating plant at each of the proposed sites; | 4.0; Appendix B |
| H. a cost analysis of the large electric power generating plant at each proposed site, including the costs of constructing and operating the facility that are dependent on design and site; | 2.3 |
| I. an engineering analysis of each of the proposed sites, including how each site could accommodate expansion of generating capacity in the future; | 4.1.1, 4.1.2, and 2.4 |
| J. identification of transportation, pipeline, and electrical transmission systems that will be required to construct, maintain, and operate the facility; | 5.2.8.2, 4.1.7, and 4.1.8 |
| K. a listing and brief description of federal, state, and local permits that may be required for the project at each proposed site; and | 1.5 |
| L. a copy of the Certificate of Need for the project from the Public Utilities Commission or documentation that an application for a Certificate of Need has been submitted or is not required. | 1.5.1 |
| **Environmental Information Requirements (Minn. Rules 7850.1900, Subp. 3)** | |
| A. a description of the environmental setting for each site or route; | 5.1 |
| B. a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services; | 5.2 |
| C. a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining; | 5.3 |
| D. a description of the effects of the facility on archaeological and historic resources; | 5.4 |
| E. a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna; | 5.5 |
| F. a description of the effects of the facility on rare and unique natural resources; | 5.5.8 |
| G. identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route; and | 5.6 |
| H. a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures. | 5.1 – 5.5 |

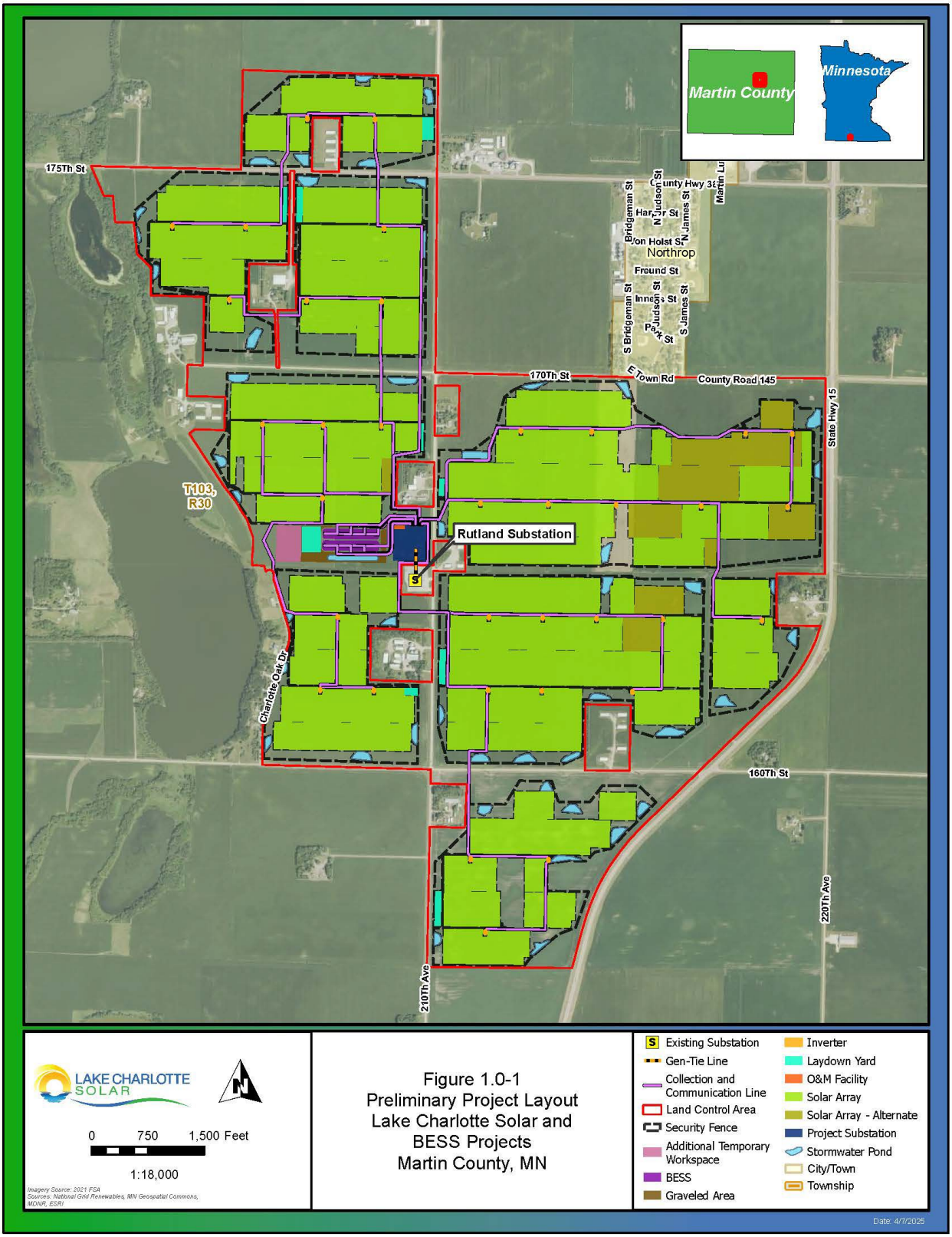
# 1.0 INTRODUCTION

Lake Charlotte Solar, LLC (Lake Charlotte, Lake Charlotte Solar, or Applicant), a wholly owned subsidiary of Geronimo Power, LLC (Geronimo Power) (formerly known as National Grid Renewables Development, LLC) respectfully submits this Joint Site Permits Application (Joint Application) to the Minnesota Public Utilities Commission (Commission) for two Site Permits pursuant to the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E) and Minnesota Administrative Rules Chapter 7850.

Lake Charlotte proposes to construct the Lake Charlotte Solar Facility (Solar Facility) and Battery Energy Storage System (BESS), collectively the Project, in Rutland Township, Martin County, Minnesota (refer to Figure 1.0-1). The Solar Facility is proposed as a solar energy conversion facility with a 150-megawatt (MW) alternating current (AC) nameplate capacity. The associated BESS will consist of a stand-alone structure with a 150 MW / 600-megawatt hour (MWh) nameplate capacity and ancillary support infrastructure.

The Point of Interconnection (POI) for the Solar Facility and BESS will be the Southern Minnesota Municipal Power Agency (SMMPA) Rutland Substation. Lake Charlotte proposes to construct a substation for the Project (i.e., the Project Substation) that will collect energy generated by the Solar Facility and move that energy to the POI via an approximately 365-foot long 161 kilovolt (kV) generation tie (gen-tie) transmission line. The BESS will function independently from the Solar Facility but will share the Project Substation and the gen-tie line. The BESS will charge its batteries with power from the existing electrical grid via the proposed gen-tie line and POI; however, the BESS may also charge its batteries with power generated by the Solar Facility. When needed, the BESS will also send electricity back into the grid via the gen-tie line and POI. The Solar Facility and BESS will be operated and maintained in tandem, using the same staff. It is estimated that three to four full-time permanent positions will be required to operate and maintain the Solar Facility and one to two full-time permanent positions to operate and maintain BESS. Figure 1.0-1 provides an overview of the Project.

Lake Charlotte is a wholly owned subsidiary of Geronimo Power. Geronimo Power is a utility-scale renewable energy development company headquartered in Bloomington, Minnesota that has developed multiple operating solar, wind, and energy storage projects throughout the United States. Over 2,900 MW of solar, wind, or energy storage projects developed by Geronimo Power are either under construction or operational. Geronimo Power has a multi-gigawatt development pipeline of solar, wind, and energy storage projects in various stages of development throughout the United States and over 1,900 MW of solar development under construction or completed. Geronimo Power provides custom renewable energy development solutions for utilities, independent power purchasers and corporations looking to harness renewable energy for business growth. Geronimo Power prides itself on developing solar, wind, and energy storage projects that are farmer-friendly, community-driven, and beneficial for rural communities.


Martin County
Minnesota
175Th St
170Th St
160Th St
County Road 145
State Hwy 15
220Th Ave
210Th Ave
Charlotte Oak Dr
Northrop
Freund St
T103,
R30
Rutland Substation
LAKE CHARLOTTE SOLAR
0 750 1,500 Feet
1:18,000
Figure 1.0-1
Preliminary Project Layout
Lake Charlotte Solar and
BESS Projects
Martin County, MN
Existing Substation
Gen-Tie Line
Collection and Communication Line
Land Control Area
Security Fence
Additional Temporary Workspace
BESS
Graveled Area
Inverter
Laydown Yard
O&M Facility
Solar Array
Solar Array - Alternate
Project Substation
Stormwater Pond
City/Town
Township
Date: 4/7/2025

## 1.1 Purpose and Need

The Solar Facility will provide up to 150 MW AC of renewable power capacity and the BESS will provide 150 MW of battery storage. By way of example, the Project will produce enough energy to provide energy for approximately 32,067 households based on the average annual energy consumption (U.S. Environmental Protection Agency [EPA], 2024a). The Project is being developed, designed, and permitted to meet or exceed applicable state and local requirements, including the prime farmland exclusion rule (discussed below) to the extent practicable.

Under Minnesota's Clean Energy Law, climate legislation establishes a carbon-free energy standard and a renewable energy standard. The carbon-free energy standard requires electrical utilities to achieve 80 percent carbon-free energy by 2030, 90 percent by 2035, and 100 percent by 2040 (Minnesota Statute Section 216b.1691, subd. 2g). Carbon-free energy sources are defined as energy sources that do not release carbon dioxide ($CO_2$), such as solar. The renewable energy standard requires that 55 percent of the energy sold to Minnesota customers by electrical utilities come from renewable energy sources, such as solar, by 2035 (Minnesota Statue Section 216b.1691, subd. 2a).

The Project will help meet Minnesota's 100 percent carbon-free energy standard by 2040 (Minnesota Statute Section 216b.1691, subd. 2g) and will contribute to meeting the Minnesota Renewable Energy Objectives and other clean energy requirements in Minnesota, neighboring states, and the country at large. The Project will displace 303 gigawatt hours of regional fossil fuel generation per year and prevent emissions of approximately 258,490 metric tons of carbon dioxide equivalent ($CO_2e$) annually (EPA, 2024b). This is equivalent to $CO_2$ emissions from approximately 144,390 tons of coal burned (EPA, 2024a). It will also serve consumers' growing demand for renewable energy under various utility- sponsored programs and for utilities, independent power purchasers and corporations seeking to use renewable energy for business growth. The Project will also benefit the local community through investment in construction spending, operation of the Project, property and business taxes, and landowner lease payments.

Additionally, the BESS is designed to operate independently and provide up to 150 MW of energy storage capacity. The impact to the grid from construction of the BESS will be positive as the BESS can store energy from the grid that may have otherwise been curtailed and inject up to 150 MW AC back into the grid during times of increased demand or during times of reduced energy production. Depending on final design, the BESS can furnish other grid services such as frequency response and voltage support.

## 1.2 Applicant Information

### 1.2.1 Permittee and Contact Information

The permittee for the Site Permit will be:

Lake Charlotte Solar, LLC
8400 Normandale Lake Blvd., Suite 1200
Bloomington, MN 55437

The contact persons regarding this Joint Application are:

Marta Lasch
Geronimo Power, LLC
8400 Normandale Lake Blvd, Suite 1200
Bloomington, MN 55437
Direct: 612.259.3093
mlasch@geronimopower.com

Jeremy P. Duehr
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Minneapolis, MN 55402
Direct: 612.492.7413
jduehr@fredlaw.com

### 1.2.2 Statement of Ownership

Lake Charlotte has a combination of lease agreements and purchase options with the landowners for the Solar Facility and BESS. The Project will be constructed, owned, and operated by Lake Charlotte, a wholly owned subsidiary of Geronimo Power. The land in the approximately 1,277-acre Land Control Area, as shown in Figure 1.0-1, is currently owned by 4-M Farms, Inc., Nathan and Amy Anders, Paul and Mary Betts, Merle Gieseke, LB Pork, Inc. LB Family Farm, LLLP, Roland Unke Trust, Todd Steuber Revocable Trust, Arlo and Violet Lueth Irrevocable Trust, Kent and Lynn Unke, and Kurt and Gedee Unke.

Lake Charlotte is also pursuing solar neighbor agreements with landowners who are not currently participating in the Project but are located within the Land Control Area or are directly adjacent to the Land Control Area. Outreach with these landowners has commenced and is ongoing.

## 1.3 Capacity and Power Purchase Agreements

The Project will provide cost-effective solar energy generation and storage. The Solar Facility and BESS will operate independently. Independent operation of the BESS allows for the BESS to receive and store energy from the grid and also inject energy back into the grid during times of increased demand. Lake Charlotte may design the Project to allow the BESS to charge its batteries from the Solar Facility. However, if this functionality is incorporated into the Project design, it would not be the primary function of the BESS. The BESS will be designed to primarily pull from and inject energy to the electrical grid.

Lake Charlotte is working to secure a Power Purchase Agreement, Build Transfer Agreement, Development Transfer Agreement, or other enforceable offtake agreements to sell the electricity, Renewable Energy Certificates, and capacity generated or stored by the Project. The power generated or stored by the Project will be offered to wholesale customers, including Minnesota utilities and cooperatives that have identified a need for additional low-cost renewable energy and capacity, and corporate and industrial customers that have set clean energy goals.

## 1.4 Schedule

The anticipated schedule for receiving Commission approval and Project construction, testing, and commercial operation is outlined below:

- Land acquisition: Complete. Lake Charlotte has lease agreements or purchase options in place for the entire Land Control Area. After issuance of the Site Permits and prior to construction of the Project, Lake Charlotte will purchase a portion of the Land Control Area from the underlying landowners with whom purchase options have been negotiated, and land under lease will enter into the construction and operations term. Land that is under a lease agreement that will not be utilized for Project operation may revert back to the underlying landowner for continued agricultural use, depending upon its location within the Land Control Area and its configuration in relation to the Project (i.e., the configuration of the land would be conducive to continued farming). Lake Charlotte is also pursuing solar neighbor agreements with landowners who are currently not participating in the Project but are directly adjacent to the Land Control Area. Outreach with these landowners has commenced and is ongoing. Any land subject to a solar neighbor agreement will not be utilized for the installation or operation of Project facilities.
- Site Permits: Lake Charlotte anticipates that Site Permits will be issued the second quarter of 2026.
- Other Permits: Lake Charlotte will acquire all other permits necessary for construction of the Project prior to conducting the work for which the permit is required. Refer to Table 1.5.4-1 Potential Permits and Approvals.
- Financing: Lake Charlotte expects to provide the majority equity investment for the Project in the first quarter of 2027. Currently, Lake Charlotte is also expected to raise tax equity capital, which is likely to be invested in the Project at or around when the Project achieves commercial operation.
- Equipment Procurement: Lake Charlotte is in the process of evaluating solar and BESS equipment for the Project. The equipment will be allocated to the Project based on meteorological and economic analysis to achieve the best match of technology for the facility locations.
- Construction: Lake Charlotte anticipates that construction will begin in the third quarter of 2027 with a targeted completion in the fourth quarter of 2028. Section 4 of this Joint Application provides additional information on the construction timeline and process.
- Commercial Testing: Testing for the Solar Facility and BESS is expected to begin as early as the fourth quarter of 2028, following the completion of construction.
- Commercial Operations: Commercial operation for the Project is scheduled to begin in the first quarter of 2029, following the completion of construction and testing.
- Decommissioning: Lake Charlotte is anticipated to be decommissioned around the time the Site Permit expires. Current Site Permits issued by the PUC expire 30 years after issuance. Repowering has been used in the case of wind farms to extend project lifespans. Repowering may be a possibility for this Project as well.

## 1.5 State Policy and Required Permits

### 1.5.1 Certificate of Need

A Certificate of Need is required for all "large energy facilities" (Minnesota Statutes section 216B.243, subd. 2), unless the facility falls within a statutory exemption from the Certificate of Need requirements (Minnesota Statutes section 216B.243, subd. 8). The Solar Facility meets the definition of a large energy facility (Minnesota Statutes section 216B.2421, subd. 2(1)); however, the Solar Facility is exempt from Certificate of Need requirements because it is a solar energy generating system and is being developed and permitted by an independent power producer (Minnesota Statutes section 216B.243, subd. 8(a)(7)), Lake Charlotte. In addition, under Minnesota Statutes section 216B.243, subd. 8(9), a Certificate of Need is not required for energy storage systems. Therefore, a Certificate of Need is not required for the proposed Solar Facility or BESS.

### 1.5.2 Site Permits

The Solar Facility falls within the definition of a Large Electric Power Generating Plant (Minnesota Statutes section 216E.01, subd. 5) and, thus, requires a Site Permit from the Commission prior to construction (Minnesota Statutes section 216E.03, subd. 1). In addition, the BESS falls within the definition of an Energy Storage System (Minnesota Statutes section 216E.001, subd. 3a), and therefore, also requires a Site Permit from the Commission prior to construction (Minnesota Statutes section 216E.03, subd. 1). Lake Charlotte submitted a Size Determination Request to the Minnesota Department of Commerce (DOC) on April 11, 2025, in accordance with Minnesota Statutes section 216E.021(b). Minnesota DOC responded to Lake Charlotte's request on April 15, 2025, noting that the Project is not associated with other planned solar projects and confirming that the Project requires siting approval from the Commission. A copy of Lake Charlotte's Size Determination Request and Minnesota DOC's response letter are provided in Appendix A.

Lake Charlotte seeks approval of its Joint Application under the alternative review process provided for under Minnesota Statutes section 216E.04 and Minnesota Rules 7850.2800 to 7850.3900. A notification letter was filed with the Commission on April 30, 2025, indicating Lake Charlotte intended to file this Joint Site Permits Application under the alternative review process. The Site Permits are the only site approvals needed for construction of the Project (Minnesota Statutes section 216E.10, subd. 1). Other permits and licenses required for the Project are listed in Section 1.5.4.

### 1.5.3 Route Permit

The gen-tie line for the Project will be approximately 365 feet long, pending final engineering design. Per Minnesota Statutes section 216E.01 subd. 4, the gen-tie line does not meet the high voltage transmission line definition because the overall length is less than 1,500 feet. As such, a separate route permit from the Commission is not required for the gen-tie line.

### 1.5.4 Other Permits and Approvals

Lake Charlotte will obtain all permits and licenses that are required for the Project, following issuance of the Site Permits. The permits or approvals that Lake Charlotte has identified as potentially being required for the construction and operation of the Project are shown in Table 1.5.4-1. Copies of agency correspondence are included in Appendix A.

**Table 1.5.4-1**
**Potential Permits and Approvals**

| Agency | Permit | Applicability | Permit Status and Timing |
|---|---|---|---|
| **Federal** | | | |
| U.S. Army Corps of Engineers (USACE), St. Paul District | Section 404 Permit for wetland impacts.<br><br>Nationwide Permit 51 for solar facility<br><br>St. Paul District Utility Regional General Permit for gen-tie line | Dredging or filling jurisdictional waters of the United States | To be obtained prior to construction, if necessary.<br><br>Pre-construction notification may be required if permanent impacts exceed threshold for Nationwide Permit or Regional General Permit. |
| U.S. Environmental Protection Agency | Spill Prevention, Control, and Countermeasures Plan | Required if any facility associated with the Project (operations and maintenance [O&M] building or substation) has oil storage of more than 1,320 gallons | To be obtained prior to construction, if necessary. |
| U.S. Fish and Wildlife Service | Information for Planning and Consultation Review for Threatened and Endangered Species | If identified as potentially present in the vicinity of the Land Control Area | To be completed prior to construction. |
| **State** | | | |
| Minnesota Public Utilities Commission | Size Determination Request | Required prior to submittal of Site Permit application | Obtained April 15, 2025 |
| | Site Permit | Required for siting approval of large electric generating plant of 50 MW or more and energy storage systems of 10 MW or more | Joint Application Submitted May 30, 2025 |

**Table 1.5.4-1**
**Potential Permits and Approvals**

| Agency | Permit | Applicability | Permit Status and Timing |
|---|---|---|---|
| | Certificate of Need | Required for generating plants larger than 50 MW unless an exemption applies | Not required if the Solar Facility is developed by an Independent Power Producer. Not required for the BESS. |
| | Route Permit | Required for high voltage transmission line that is greater than 1,500 feet in length with a voltage of 100 kilovolts or greater | Because the gen-tie line is less than 1,500 feet in length, a Route Permit is not required. |
| Minnesota Pollution Control Agency | Section 401 Certification | Required to comply with state water quality standards for filling in jurisdictional waters of the United States and if a Section 404 permit is required from the USACE | To be obtained prior to construction, if necessary. |
| | National Pollutant Discharge Elimination System General Permit (includes Stormwater Pollution Prevention Plan) | For stormwater discharges from construction activities with disturbances greater than one acre | To be obtained prior to construction. |
| | Air Quality Permit Applicability Determination Request | Optional. Can be requested by an applicant prior to installation of emissions-generating equipment | To be submitted prior to installation and operation of emergency generator(s) and fuel tank(s). |
| | Air Quality Permit | Required if operational facility criteria pollutant and hazardous air pollutant emissions exceed permitting threshold levels. | Permit to be obtained prior to construction if needed, per the applicability determination request. |
| Local Government Unit (LGU) – Martin County Soil and Water Conservation District | No-loss Provision or Replacement Plan Approval for impacts to Wetlands under the Minnesota Wetland Conservation Act | Required for impacts to wetlands | To be obtained prior to construction, if necessary. |
| Minnesota Department of Health | Well construction permit | Required for installation of a well at the O&M building, if planned. | To be obtained prior to construction. |

**Table 1.5.4-1**
**Potential Permits and Approvals**

| Agency | Permit | Applicability | Permit Status and Timing |
|---|---|---|---|
| Minnesota Department of Natural Resources (MDNR) | Water Appropriation Permit | Required if water withdrawals via well or surface water. | To be obtained prior to construction, if necessary. |
| | Natural Heritage Review Request | If identified as potentially present in the vicinity of the Land Control Area | To be completed prior to construction |
| | Utility License to Cross Public Waters | Required for utility line crossings of all Public Waters Watercourses and Basins; or Public Waters Wetlands on MDNR Administered Land. | No Public Waters will be affected by the proposed Project. |
| | Work In Public Waters | Required for work within Public Waters and Public Water Wetlands on Private Lands | No Public Waters will be affected by the proposed Project. |
| Minnesota Department of Labor and Industry | Request for Electrical Inspection | Required to comply with the state electrical code | To be obtained during construction. |
| State Historic Preservation Office (SHPO) | Review and Coordination | Provide approval of Phase 1 field inventory methods and findings | Completed prior to initiation of construction. |
| Minnesota Department of Transportation (MNDOT) | Application for Utility Accommodation on Trunk Highway right-of-way | Installing utilities along, across or within trunk highway right-of-way | To be obtained prior to installation of utilities within MNDOT right-of-way, if necessary. |
| | Access (Driveway) Permit | Required for construction of a driveway/access road utilizing MNDOT rights- of-way. | Not likely to be needed. Project entrances do not affect state highway. |
| | Oversize/Overweight Permit | Vehicles delivering equipment, materials and supplies that exceed applicable MNDOT height/length limits and weight limits | Obtain prior to equipment deliveries, if necessary. |
| **County/Local** | | | |
| Martin County | Subsurface Sewage Treatment System Permit required prior to installation of any septic system in Martin County | Required prior to installation of any septic system in Martin County. | To be obtained prior to construction. |

**Table 1.5.4-1**
**Potential Permits and Approvals**

| Agency | Permit | Applicability | Permit Status and Timing |
|---|---|---|---|
| | Driveway or Entrance Permit | Required for access from county roads. | To be obtained prior to construction. |
| | Utility Permit | Required to place, construct, maintain utilities across, along or within county highway road right-of-way | To be obtained prior to construction, if necessary. |
| | Moving Permit | Required for overweight or over size loads. | To be obtained prior to construction. |
| | Petition to realign / abandon public drain tile | Required if any public drain tile needs to be partially realigned or partially abandoned to accommodate the Project | To be obtained prior to construction |

# 2.0 PROJECT INFORMATION

Lake Charlotte is currently developing the Lake Charlotte Solar Facility, an up to 150 MW AC solar photovoltaic facility and a BESS with a 150 MW / 600 MWh nameplate capacity and ancillary support infrastructure. The Project is in northeast Martin County, Minnesota. The Project will interconnect into the SMMPA Rutland Substation (i.e., the POI for the Project), which is adjacent to the Project. Details about the engineering and operation design of the Project facilities are presented in Section 4.0.

## 2.1 Project Location, Land Control, and Preliminary Development Areas

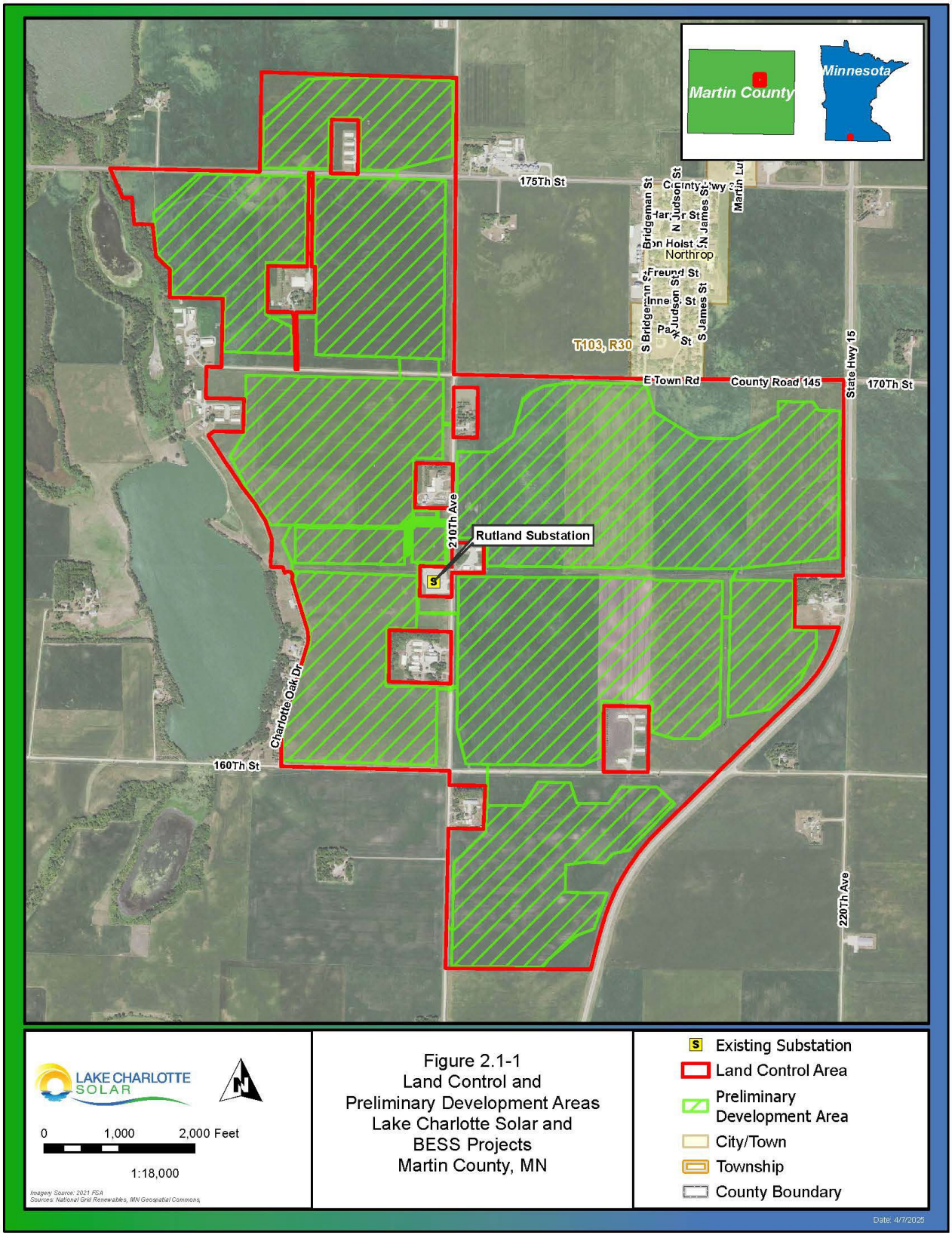
Lake Charlotte is proposing to build a 150 MW AC Solar Facility in Township 103N, Range 30W, Sections 5, 8, 9, 16, 17, 20, and 21 in Rutland Township, Martin County, Minnesota (refer to Figure 1.0-1). Lake Charlotte is proposing to build an up to 150 MW / 600 MWh BESS adjacent to the Project Substation in Rutland Township, Township 103N, Range 30W, Section 17.

Lake Charlotte has obtained leases and purchase options for approximately 1,277 acres of privately-owned land (Land Control Area). The northeastern edge of the Land Control Area abuts the southern municipal boundary of Northrop where it parallels 170$^{th}$ Street in Township 103N, Range 30W, Section 16. Lake Charlotte selected the Land Control Area based on significant landowner interest, transmission and interconnection suitability, optimal solar resource, and minimal impact on environmental resources. Existing infrastructure in the immediate vicinity allows Lake Charlotte to minimize the need to construct ancillary facilities beyond the immediate footprint of the Project. Existing infrastructure includes the SMMPA Rutland Substation and high voltage transmission lines that tie directly into the existing electrical grid.

Based on preliminary design, the area needed to construct and operate the Project (i.e., the Preliminary Development Area) will cover up to 1,004 acres of the Land Control Area. Based on preliminary discussions with Martin County, Lake Charlotte is aware of county-maintained drain tile that is present in the northeast portion of the Land Control Area. With the support of the affected participating landowners, Lake Charlotte is discussing the process for abandoning the drain tile in this location with the county. If the county approves the drain tile modification, Lake Charlotte proposes to adjust the layout of the solar arrays to place solar arrays and associated infrastructure in the northeastern portion of the Preliminary Development Area. Figure 1.0-1 shows both the current layout for the solar arrays and the potential alternate layout for the solar arrays (labeled as Solar Array – Alternate and shown as tan shading in Figure 1.0-1). If alternate solar arrays in the northeast portion of the Preliminary Development Area are utilized, an equal amount of array, shown in green on Figure 1.0-1, would not be necessary to meet the Project's nameplate capacity. To provide flexibility while Lake Charlotte's coordination with Martin County regarding the drain tile progresses, Lake Charlotte is including both the currently contemplated solar array layout and the potential alternate array layout in the Preliminary Development Area described throughout this Joint Application. As such, the total acres of the Preliminary Development Area are overstated by approximately 58.0 acres.

There are at least 273 acres of the Land Control Area for which Lake Charlotte has site control but are not currently contemplated for occupation by the Solar Facility or BESS. The 273-acre portion of the Land Control Area that will not be utilized for the Project is currently under lease with the underlying landowners, or has been purchased, but may be excluded from the area controlled by Lake Charlotte during operation of the Project. Figure 2.1-1 shows an overview of the Land Control and Preliminary Development Areas.

Lake Charlotte has entered into lease or purchase option agreements with landowners for all of the parcels within the Land Control Area. Lake Charlotte would exercise its purchase options and hold title to the property it will purchase after the Site Permits are issued and prior to the start of construction. Concurrently, leased property that will be utilized by the Project will move into an operation term of the lease agreement and property under lease that is not utilized by the Project may be removed from the lease agreement and the underlying landowners will continue to have the option to farm the released property, or areas which continue to be leased but are not utilized for the Project where there is sufficient room to operate large farming equipment.


Martin County
Minnesota
175Th St
Northrop
T103, R30
E Town Rd
County Road 145
State Hwy 15
170Th St
210Th Ave
Rutland Substation
Charlotte Oak Dr
160Th St
220Th Ave
LAKE CHARLOTTE SOLAR
0 1,000 2,000 Feet
1:18,000
Imagery Source: 2021 FSA
Sources: National Grid Renewables, MN Geospatial Commons
Figure 2.1-1
Land Control and
Preliminary Development Areas
Lake Charlotte Solar and
BESS Projects
Martin County, MN
Existing Substation
Land Control Area
Preliminary Development Area
City/Town
Township
County Boundary
Date: 4/7/2025

## 2.2 Project Overview and Interconnection

In this Joint Application, Lake Charlotte provides a preliminary Project layout that includes both the Solar Facility and BESS. The preliminary Project layout is subject to final micro-siting.

The preliminary layout of the Solar Facility contemplates both a below-ground electrical collection system (refer to Map 3 –Preliminary Project Layout, Map 4 – Detailed Preliminary Project Layout, and displayed in more detail in Appendix B – Site Plan) and a hybrid below-ground and aboveground electrical collection system. In the hybrid collection system, aboveground electrical lines would only be used to connect solar panels within each solar array and would be strung under the solar panels from the solar panel piles, while electrical lines between the arrays and the Project Substation would be installed below-ground. If a hybrid electrical collection system is used, the Solar Facility layout would be the same as the below-ground electrical collection system layout.

The Solar Facility will be located within the Preliminary Development Area and will include solar panels and racking, inverters, security fencing, a Project Substation, on-site below-ground or hybrid below-ground and above-ground electrical collection and communication lines, and up to six weather stations (up to 20 feet tall). Section 4.1.1 discusses this equipment in more detail. Eight laydown areas are proposed for the Project, regardless of which electrical collection scenario is used.

The Project Substation will be constructed near the center of the Preliminary Development Area, on the west side of 210$^{th}$ Avenue, and adjacent to the SMMPA Rutland Substation (i.e., the POI). An approximately 365-foot long 161 kV gen-tie line will interconnect the Project Substation to the SMMPA Rutland Substation. Transformers located within the Project Substation would step up the electricity generated by the Solar Facility from 34.5 kV to 161 kV to bring the power into the existing electrical grid.

The BESS will also be located within the Preliminary Development Area, adjacent to the Project Substation, and will include 192 BESS modules that contain multiple batteries installed in purpose-built enclosures. The preliminary BESS design also includes six augmentation batteries adjacent to each BESS unit, for a total of 288 augmentation batteries. Additional information about BESS battery augmentation is presented in Section 4.1.2. Within the BESS, underground collection and communication lines will be installed to connect the BESS units to the Project Substation. From the Project Substation, the BESS will interconnect to the Project POI via the same gen-tie line that will interconnect the Solar Facility. The Project may be designed to allow the BESS to charge its batteries from the Solar Facility. However, if this functionality is incorporated into the Project design, it would be used sparingly and only as needed; the BESS pulling charge from the electrical grid will be the primary function of the BESS. Access roads will be installed between the BESS units to allow access for operations personnel.

An operations and maintenance (O&M) building and associated parking lot will also be constructed in the northwest corner of the Project Substation and will be shared by both the Solar Facility and BESS.

Security fencing will encompass all Solar Facility and BESS components, and warning signs will be installed on the security fencing in accordance with the National Electrical Safety Code

(NESC). The solar arrays will be fenced separately from the Project Substation and BESS. The Project Substation and BESS will each be fenced separately. Gates will be installed at the entrance to each facility and signs will be installed on the entrance gates providing a 24-hour emergency response number. The areas within the fence line of the Solar Facility that surround the solar arrays and racking, including the proposed stormwater ponds throughout the Preliminary Development Area, will be revegetated in accordance with the Vegetation Management Plan prepared for the Project (refer to Appendix C), with the exception of access roads which will be graveled. The areas within the fence lines of the Project Substation and BESS will be graveled for operation of these facilities.

The preliminary Project layout presented herein reflects Lake Charlotte's effort to maximize the energy production of the Solar Facility and follow applicable setbacks, while minimizing impacts from the Project to the land, environment, and surrounding community. The final Project layout may differ from the preliminary layout and the current boundaries of the Preliminary Development Area described in this Joint Application but will not extend beyond the outer boundaries of the Land Control Area, except in locations where the electrical collection lines connect noncontiguous portions of the Solar Facility arrays and where the gen-tie line connects the Project Substation to the SMMPA Rutland Substation. The final layout will remain similar to the preliminary layout presented on Maps 3 and 4 and in the Site Plan in Appendix B, changes may occur as a result of ongoing site evaluation, permitting process, neighboring landowner preferences, and micro-siting activities.

## 2.3 Anticipated Costs

The total capital costs for development of the Project are estimated to range between approximately $360.9 - $434.5 million, with costs depending on variables including, but not limited to, construction costs, taxes, tariffs, and panel selection, along with associated electrical and communication systems, and access roads. Costs associated with the various components are detailed in Table 2.3-1.

**Table 2.3-1 Estimated Project Costs**

| Project Components | Cost (in $) |
|---|---|
| **Solar Facility** | |
| Engineering, Procurement, Construction Contractor | $225- $260 million |
| Development Expense | $6- $8 million |
| **BESS** | |
| Engineering, Procurement, Construction Contractor | $120- $150 million |
| Development Expense | $2- $3.5 million |
| **Solar Facility and BESS** | |
| Interconnection (Transmission Owner Facilities, Regional Network Upgrades, and allocated Affected Systems upgrades) | $2.8 million |
| Financing | $5- $10 million |
| Project Gen-tie Line | $100- $150 thousand |
| **Project Total** | **$360.9 - $434.5 million** |

## 2.4 Future Expansion

Lake Charlotte does not anticipate future expansion of the Project. Land will be leased or purchased for the 30-year operational life of the Project. Lake Charlotte Solar has an executed Generator Interconnection Agreement with SMMPA and Midcontinent Independent System Operator, Inc (MISO), enabling the Project to interconnect at the SMMPA Rutland Substation (the Project POI). The agreement accommodates up to 150 MW AC from the Solar Facility.

The Applicant is pursuing an additional Generator Interconnection Agreement through MISO's surplus interconnection service for the BESS to operate independently and receive and store energy directly from the electric grid. The Project Substation will provide the BESS with an independent connection to the electrical grid. The BESS could accommodate up to 150 MW of surplus energy from the electrical grid and inject it back into the electrical grid during times of increased demand. At any given point, the BESS would not inject over 150 MW at the POI. The BESS provides grid support to avoid power outages and will likely charge at night from the electric grid and discharge in the morning and evening.

# 3.0 PROHIBITED AND EXCLUSION SITES

Minnesota Rules 7850.4400 subp. 1 prohibits large electric power generating plants from being located in areas that include: national parks; national historic sites and landmarks; national historic districts; national wildlife refuges; national monuments; national wild, scenic, and recreational riverways; state wild, scenic, and recreational rivers and their land use districts; state parks; nature conservancy preserves; state scientific and natural areas; and state and national wilderness areas. The Project is not located within any prohibited areas.

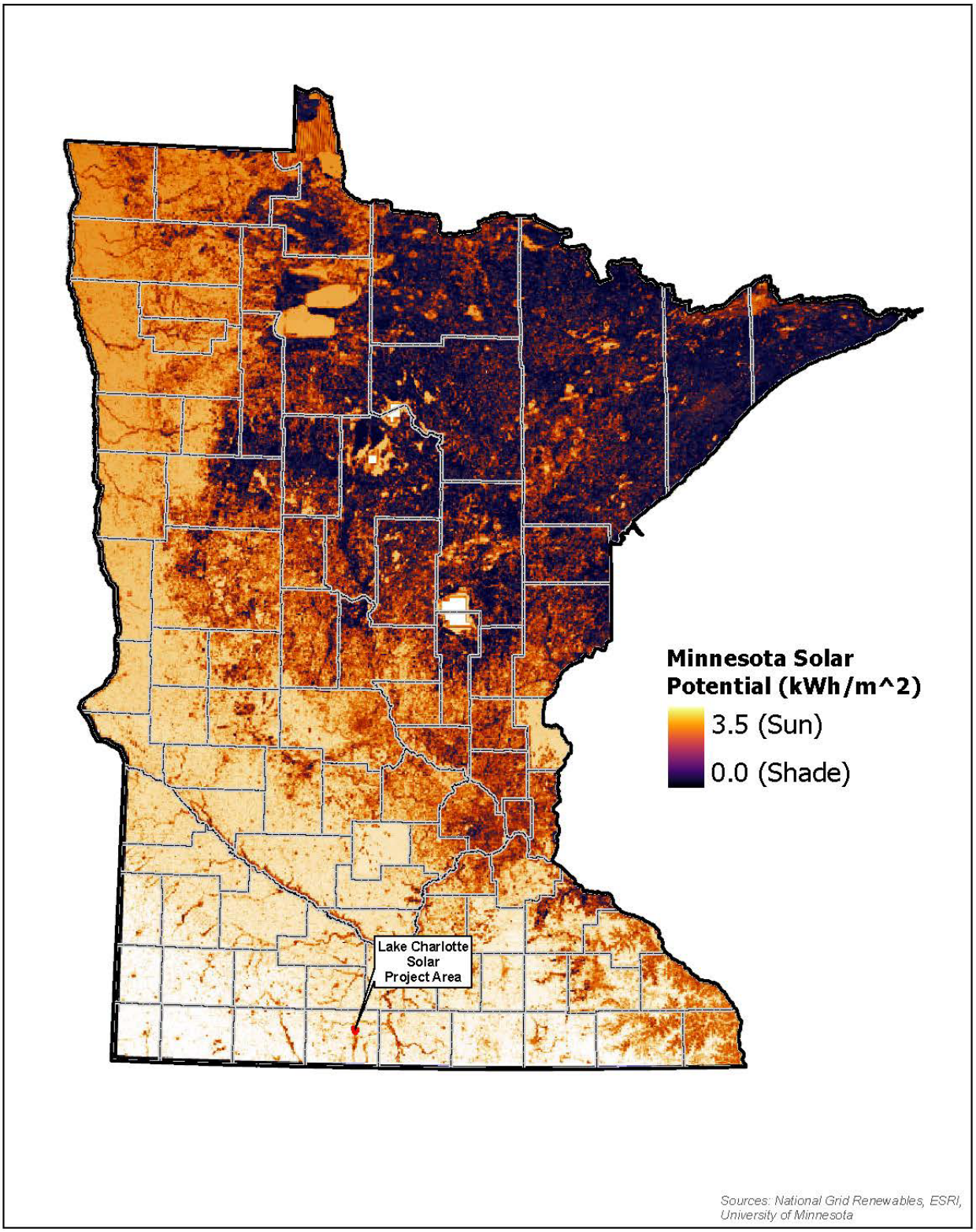
Additionally, Minnesota Rules 7850.4400 subp. 3 excludes large electric power generating plants from being located in the following areas unless there is no feasible and prudent alternative. These exclusion areas include state registered historic sites; state historic districts; state Wildlife Management Areas; county parks; metropolitan parks; designated state and federal recreational trails; designated trout streams; and state water trails. The Project is not located within any exclusion areas. An analysis of Lake Charlotte's avoidance of exclusion areas and other sensitive environmental areas is provided below in Section 5.0.

Minnesota Rules 7850.4400, subp. 4 (Prime Farmland Rule) excludes large energy power generating plants from being permitted where the developed portion of the site includes more than 0.5 acre of prime farmland per MW of net generating capacity unless there is no feasible and prudent alternative. The Lake Charlotte Preliminary Development Area is sited on prime farmland (refer to Section 5.5.4). Given the 150 MW AC net generating capacity of the Solar Facility, this rule would allow use of up to 100 acres of prime farmland for the Solar Facility. The BESS is not subject to the Prime Farmland Rule. The Preliminary Development Area, including the 16-acre BESS area, which is not subject to the Rule, is 1,004 acres of which approximately 318.0 acres are prime farmland and 658.8 acres are prime farmland if drained. These acreages of prime farmland would be used for operation of the Solar Facility for the life of the Project, but as described below, would not be permanently precluded from use for agricultural purposes in the future. An analysis on potential alternatives to avoid prime farmland is provided in Appendix D and summary of the analysis results is provided in Section 3.3.

## 3.1 Selection of the Land Control Area

Lake Charlotte explored Martin County for the Project based on the high solar resource in this portion of the state (refer to Figure 3.1-1). This exceptional solar resource and supportive community were foundational to the Project conception. Lake Charlotte identified the SMMPA Rutland Substation as a potential interconnect location in Martin County because of its available capacity to interconnect the Project to the transmission system, the presence of adequate roads for access, and relatively flat, unobstructed terrain in the vicinity of the SMMPA Rutland Substation to maximize the utilization of the solar resource. Lake Charlotte reviewed real estate options within approximately five miles of the SMMPA Rutland Substation. This distance was selected to account for transmission interconnect efficiency, which is essential to successful development of the Project.

**Figure 3.1-1 – Minnesota Solar Potential (University of Minnesota, 2024)**



Siting the Project Substation and BESS in proximity to an existing substation allows Lake Charlotte to make efficient use of existing equipment, minimize line loss, and minimizes the length of the transmission line needed to interconnect the Project; additional details about Project interconnection are provided in Section 4.1.7. Lake Charlotte signed leases and/or purchase options with landowners that owned relatively flat, unobstructed, generally contiguous parcels of land, with no or limited environmentally sensitive resources, that are directly adjacent to the SMMPA Rutland Substation, and who voluntarily opted to host facilities for the Project. Due to the proximity to the SMMPA Rutland Substation, the need for new transmission infrastructure is limited to a gen-tie line that is approximately 365 feet in length.

## 3.2 Exclusion Areas and Sensitive Environmental Features Avoidance Analysis

Lake Charlotte evaluated potential constraints during site selection to determine whether the Project can avoid human settlement and environmental constraints to the maximum degree practicable and to determine which parcels should be avoided. Key constraints that were considered include transmission interconnection, willing landowners to sell or lease land for the Project, and environmental constraints that may prohibit or make development more challenging.

Within Martin County and five miles from the SMMPA Rutland Substation, Lake Charlotte avoided parcels with environmental constraints that may prohibit or make solar development more challenging. These include parcels that are:

- owned or managed by a state or federal agency (e.g., state park, WMA, or Waterfowl Production Area);
- within a municipality;
- within two miles of an airport;
- with U.S. Fish and Wildlife Service (USFWS) designated critical habitat;
- with Minnesota Department of Natural Resources (MDNR) Sites of Biodiversity Significance;
- with MDNR mapped native plant communities and native prairie;
- with MDNR Public Waters Inventory watercourses; and
- with MDNR rare species records.

These constraints, and the parcels most suitable for solar development without these features, are displayed on Map 5 - Potential Solar Development Constraints. As shown on Map 5, Lake Charlotte has sited the Project with voluntary leases and/or purchase options near a substation, and in a location that avoids the sensitive resources identified above.

## 3.3 Prime Farmland Assessment

The Prime Farmland Rule prohibits large energy power generating plants, such as the Solar Facility, 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 or unless the project meets one of the Rule's exemptions. In May 2020, the Minnesota DOC issued the *Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives* (Minnesota DOC, 2020). Some areas (e.g., within two miles of certain cities) are not subject to the Prime Farmland Rule; however, the only exception to Minnesota Rules 7850.4400, subp. 4 is if there is no "feasible and prudent" alternative to the project location. The guidance document is intended to assist solar developers in evaluating whether there is a feasible and prudent siting alternative to the proposed project location. Lake Charlotte completed an evaluation of potential alternatives in an attempt to find a location for the Project that would use fewer acres of prime farmland.

The selected location better meets the needs of the Solar Facility and avoids prohibited areas to the maximum extent practicable. In addition, there is relatively little opportunity to avoid impacts to prime farmland in the state of Minnesota where high solar potential exists. Areas where non-prime farmland is more prevalent are generally associated with steep slopes, forested areas, wetlands and floodplains, and other areas not suitable for solar development. In addition, areas of non-prime farmland that are not constrained by natural resources do not have adequate area available to support a 150 MW solar facility. The detailed analysis is provided in Appendix D. Lake Charlotte's assessment demonstrates that Lake Charlotte was unable to find a feasible and prudent alternative location for the Solar Facility.

## 3.4 Alternatives Considered but Rejected

Per Minnesota Statutes Section 216E.04, subd. 2(8-9), both the Solar Facility and BESS qualify for the alternative review process specified in Minnesota Rules 7850.2800-7850.3900. Accordingly, Lake Charlotte is not required to analyze alternative sites unless it considered and rejected alternative sites, pursuant to Minnesota Rules 7850.3100. Lake Charlotte considered other areas of Minnesota where the Project could be sited to comply with the prime farmland rule, as discussed in Section 3.3 and Appendix D. However, no feasible or prudent alternative to the Land Control Area described herein was identified as a result of this analysis and no alternative sites were carried forward for the Project. Lake Charlotte selected the Land Control Area for the Project because of the proximity to existing electrical transmission infrastructure, willing participants, optimal solar resource, and opportunity to minimize environmental impacts to the extent practicable.

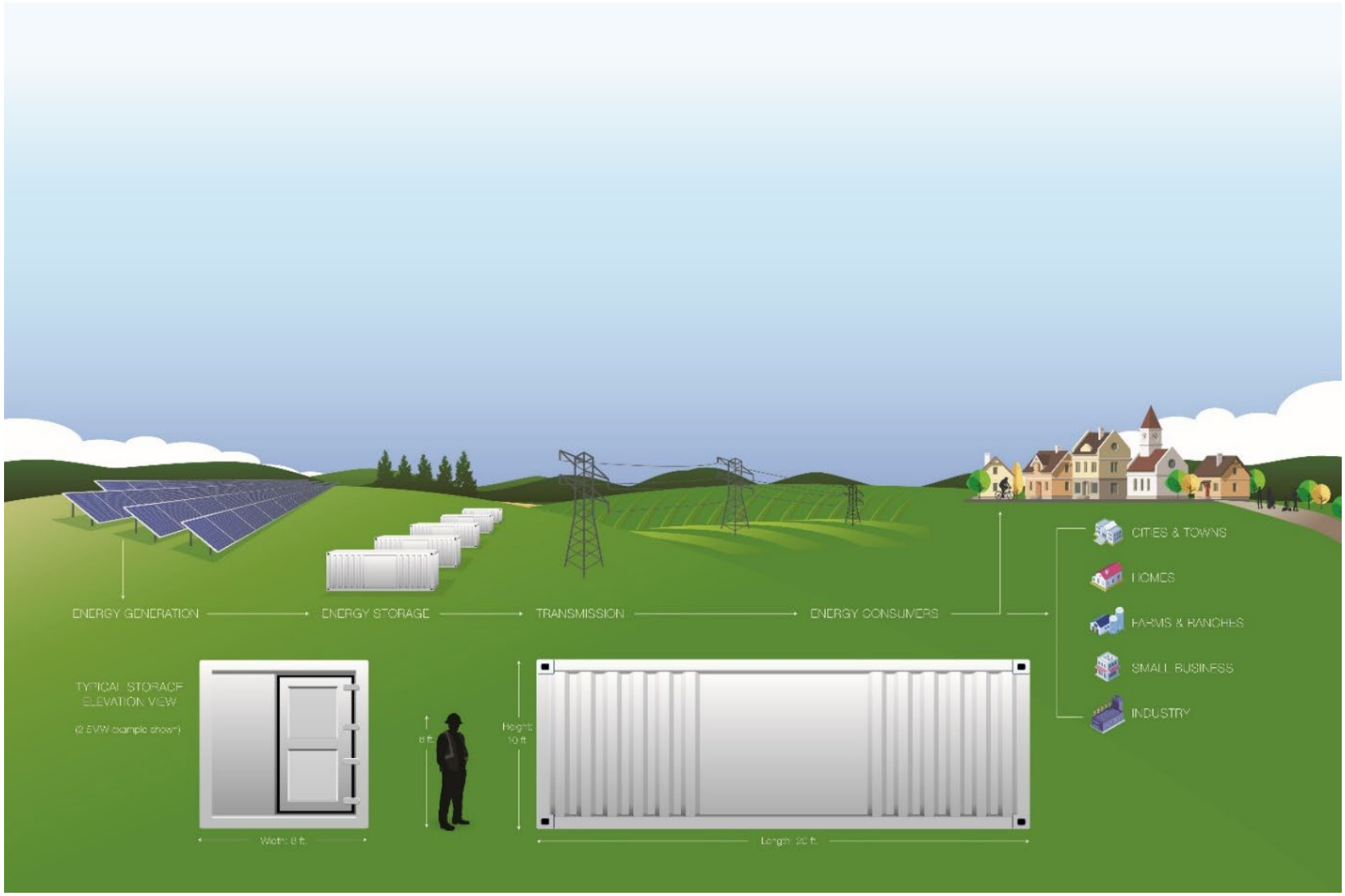
# 4.0 ENGINEERING AND OPERATIONAL DESIGN

The following sections describe the designs of the Solar Facility and BESS, including equipment, components, access roads, safety features, associated facilities, temporary facilities, and interconnection facilities. The Preliminary Development Area for the Project is shown on Figure 2.1-1 and on the Site Plan in Appendix B.

Figure 4.0-1 outlines the process of converting solar energy and connecting it to the transmission grid; this figure also shows how power is transferred to/from the BESS and the transmission grid. The process begins with solar panels converting energy from sunlight into direct current (DC) electrical power. Discrete sets of panels will be electrically connected in series via DC electrical cables and connected to an inverter. The inverters will convert the DC power (approximately 1,500 volts) from the panels to AC power (650-950 volts depending on the inverter specifications). The inverters connect to a transformer, which will step up the AC voltage of generated electricity to 34.5 kV. From the transformers, buried electrical cable will carry the electricity from the transformer to the Project Substation. Buried cables will be approximately four feet below ground. Transformers in the Project Substation will step up the voltage from 34.5 kV to 161 kV. The electricity will then be carried via the above ground 161 kV gen-tie line to interconnect to the electrical grid via the SMMPA Rutland Substation (i.e. the POI for the Project).

The BESS will connect independently to the Project Substation but will connect to the SMMPA Rutland Substation via the same 161 kV gen-tie line as the Solar Facility. Electrical connections between the BESS and Project Substation, and between the Project Substation and SMMPA Rutland Substation, will allow for bi-directional flow of electricity. During times when energy is available on the electric grid, electricity will be directed from the SMMPA Rutland Substation to the Project Substation where it will be stepped down from 161 kV to 34.5 kV. Energy may also be taken from Solar Facility production where it will stay on the 34.5 kV side of the Project Substation (instead of being transmitted directly to the electric grid). The electricity will then be transferred to the BESS via buried below-ground 34.5 kV electrical cables. Once the energy reaches the BESS inverters, the AC power will be converted back to DC power and stored in the BESS unit's lithium-ion batteries. At times when the electric grid experiences increased demand, energy will be released from the BESS units, converted back to AC power, and sent back to the transformer within the Project Substation where it will be stepped up to 161 kV and transferred to the SMMPA Rutland Substation via the 161 kV gen-tie line. The BESS provides grid support to avoid power outages.

**Figure 4.0-1: Harvesting Solar Energy and Battery Storage**



## 4.1 Project Design

### 4.1.1 Solar Facility

The Solar Facility will likely utilize thin film photovoltaic panels with tempered glass that may vary in size but are generally four to seven feet long by two to four feet wide and one to two inches thick. The current design shows approximately 362,000 panels in the primary array. The panels will be installed north to south on a tracking rack system that utilizes steel for the foundations and aluminum for the frame. Motors allow the racking (and attached photovoltaic panels) to rotate from east to west throughout the day. Each tracking rack will contain multiple panels. On the tracking rack system, panels will be approximately 15 feet in height from the ground to the top of the panels when at a 45-degree angle (refer to Figure 4.1.1-1). Height may vary due to manufacturer, topography, and vegetation constraints and could reach a height of approximately 20 feet from the ground. The photovoltaic panels will have a silicon and weatherized plastic backing or a side-mount or under-mount aluminum frame, heat strengthened front glass, and laminate material encapsulation for weather protection. The main protection built into the module is from light wind, dust, sand and precipitation. Tracker technology helps prevent hail and wind damage to the modules by safely stowing the modules in a way that limits/reduces the risk of damage to the modules.

To limit reflection, solar photovoltaic panels are constructed of dark, light-absorbing materials. Today's panels reflect as little as two percent of the incoming sunlight depending on the angle of the sun and assuming use of anti-reflective coatings, which will be used. The solar arrays will occupy most of the Solar Facility.

#### 4.1.1.1 Linear Axis Tracking Rack System

A linear axis tracking rack system allows the photovoltaic panels to track the sun throughout the day. The panels and tracking rack system are generally aligned in rows north and south with the photovoltaic panels facing east toward the rising sun in the morning, parallel to the ground during midday, and then west toward the setting sun in the afternoon. The panels are rotated by a small motor connected to the tracking rack system to slowly track with the sun throughout the day. The tracking rack system allows the Solar Facility to optimize the angle of the panels in relation to the sun throughout the day, thereby maximizing production of electricity and the capacity value.

The tracking rack system is mounted on top of steel piers that are typically driven into the ground, without the need for excavation or concrete to install the piers. The piers are driven into the ground with a hydraulically powered high-frequency hammer mounted on a tracked carrier. Piers are typically installed at 8 to 15 feet below the surface, pending site-specific conditions that will be determined through geotechnical borings prior to construction. Figures 4.1.1-1 through 4.1.1-3 visually show the general racking equipment and dimensions of a linear axis tracking rack system.

**Figure 4.1.1-1: Tracking Rack System**

**Figure 4.1.1-2: Approximate Tracking Rack System Dimensions**

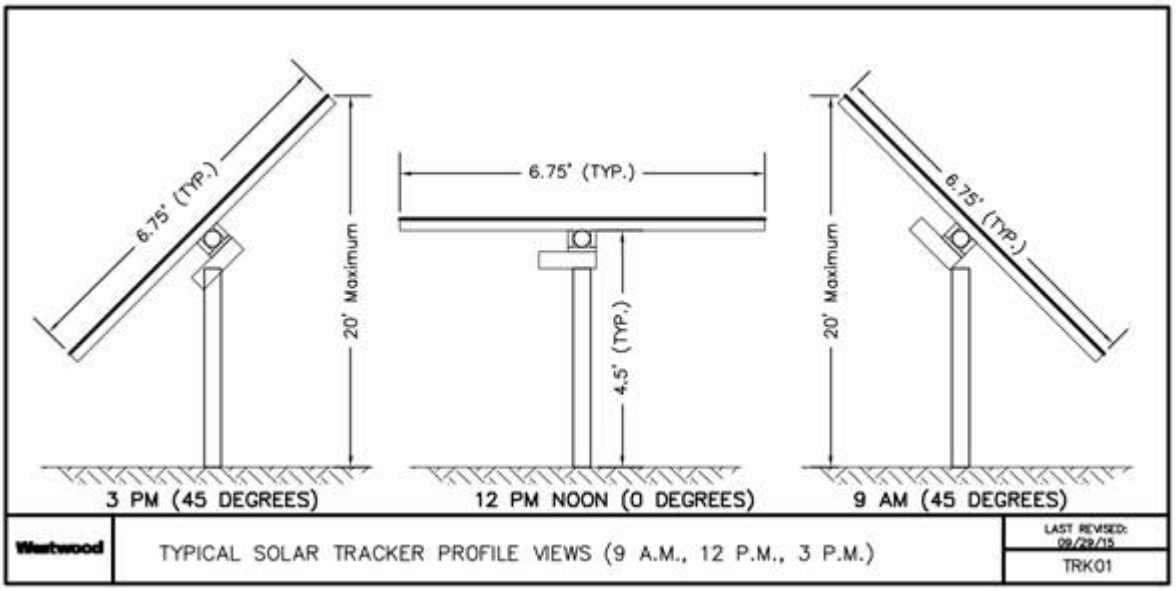


**Figure 4.1.1-3: Standard Steel Pier Foundations**

### 4.1.1.2 Inverters, Transformers, and Electrical Collection System

Solar panels collect and release energy as DC power at approximately 1,500 volts. Inverters, placed at the end of solar arrays, are required to convert the DC power generated by the solar panels to the AC power that is needed to transmit the energy through cabling into transformers, then the Project Substation, and ultimately into the electrical grid. Transformers are used to step up or step down AC voltages. For the Solar Facility, a transformer will be used to step up the voltage from the solar panels to 34.5 kV before it is transmitted to the Project Substation. Another transformer will be located within the Project Substation that will further step up the AC voltage from 34.5 kV to 161 kV before it is transmitted to the SMMPA Rutland Substation via the 161 kV gen-tie line. The voltage is required to be at 161 kV to interconnect with the SMMPA Rutland Substation and the existing electrical grid.

The electrical collection system of the Solar Facility is made up of electrical cables that connect the solar arrays, inverters, transformers, and Project Substation. The electrical collection system for the Solar Facility will be installed either below-ground or in a hybrid arrangement with above-ground cabling connecting the solar arrays to one another and below-ground cables connecting the solar arrays to the Project Substation. For both options, below-ground collection lines will be installed approximately four feet below ground surface.

The electrical collection system will be site-specific depending on geotechnical analysis, constructability, costs, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system. The electrical cables that would be used for each type of electrical collection system are described below.

**Below-ground Electrical Collection System**

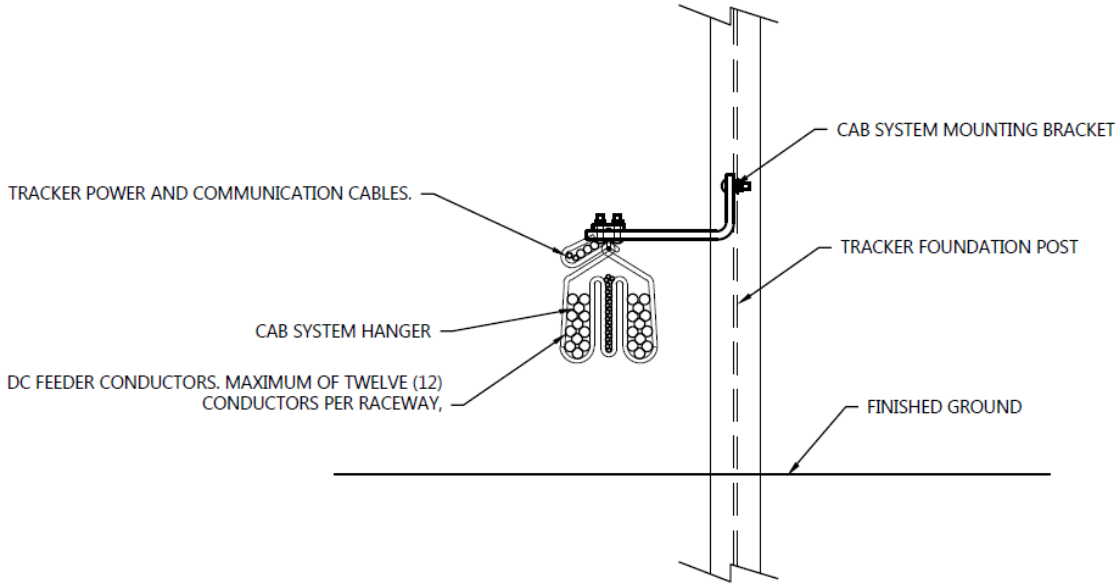
The solar panels deliver DC power to the inverters through cabling that will be located within a below-ground trench (approximately four feet deep). Below-ground AC collection systems from the inverter skids to the Project Substation will be installed in trenches or ploughed into place at a depth of approximately four feet below grade. During all trench excavations, the topsoil and subsoil will be removed and stockpiled separately in accordance with the Agricultural Impact Mitigation Plan for the Project (refer to Appendix E). Once the cables are laid in the trench, the area will be backfilled with subsoil followed by topsoil.

**Hybrid Below-ground and Above-ground Electrical Collection System**

A hybrid below-ground and above-ground electrical system is being considered for the Solar Facility for several reasons including ease of access for operations and maintenance, reduced ground disturbance, and cost considerations. If above-ground cabling is utilized, it would only be utilized to connect solar panels together within each solar array.

In the hybrid electrical collection system, DC collection cables will be strung under each row of panels on steel arms and a steel cable attached to the piles. At the end of each row, hanging brackets will connect several racks/rows of cables to a common collection point near their assigned inverter/transformer skid where the cables will then be routed below-ground to the inverter/transformer skid where the current is converted to AC and voltage is stepped up to 34.5 kV. A typical drawing of the hanging brackets at the end of each row is provided below in Figure 4.1.1-4. From the inverter/transformer skid, the AC collection will be installed below ground to the Project Substation. The 34.5 kV collection and communication lines between solar arrays and the Project Substation will be routed below-ground at an approximate depth of four feet. Cables connecting each unit of solar arrays will be directionally bored under county roads.

**Figure 4.1.1-4: Typical Above-Ground DC Collection Hanging Bracket**

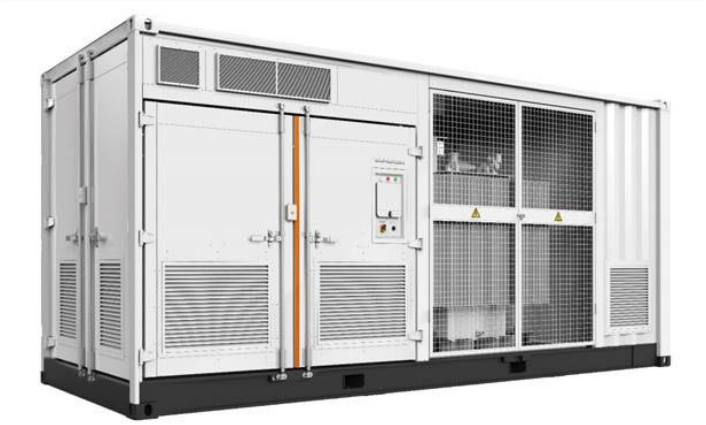



## Central Inverter/Transformer Skids

Regardless of the collection system configuration (below-ground or hybrid), the Solar Facility will utilize central inverter/transformer skids and include a transformer into which the inverters will feed electricity (refer to Figure 4.1.1-5). The final number of inverters will depend on the inverter size, as well as inverter and panel availability. The preliminary design proposes up to 32 primary central inverter skids; the preliminary layout would be the same regardless of which electrical collection system configuration is selected. These skids provide the foundation for the inverter, transformer, and Supervisory Control and Data Acquisition (SCADA) system. The skids will be placed atop a concrete slab or pier foundations and typically measure 10 feet wide by 25 feet long, with a structure height of approximately 12 feet above grade. Concrete slabs are typically 1 to 1.5 feet deep and pier foundations are up to 15 feet deep. Concrete slabs would be used if subgrade soil conditions are such that skin friction and end bearing values are too low to support driven pile foundations. Pier foundations would be used as a typical foundation solution as long as the subgrade soil conditions allow for driven piles. This would represent good skin friction and end bearing capacities. Concrete foundations will be poured onsite or precast and assembled off-site.

The inverter/transformer skids will be located in the interior of the Solar Facility along access roads. Typical drawings of inverters are included in the Site Plan in Appendix B and Figure 4.1.1-5 below shows a typical central inverter and step-up transformer station.

**Figure 4.1.1-5: Typical Inverter and Transformer Station**



### 4.1.2 Battery Energy Storage System

The BESS will aid with regulating power distribution by charging its batteries with power from the existing electrical grid when demand is low and sending electricity into the grid when demand is high. This will allow Lake Charlotte to maximize energy output and efficiently utilize interconnection facilities and will, in part, reduce costs for interconnection customers and improve wholesale market competition by helping to reliably stabilize the electrical grid. Cost reduction is derived from reduced system congestion, which allows for greater overall transmission capacity for all interconnected facilities.

The rated power capacity of the proposed BESS is up to 150 MW and the energy capacity is 600 MWh. The storage duration is 4 hours. When the BESS is operating at full capacity and discharging 150 MW, it is able to discharge for 4 hours. Rated power capacity is the maximum rate of discharge (MW) that the BESS can achieve. Energy capacity is the maximum amount of stored energy (MWh). Storage duration is the amount of time storage can discharge at its power capacity before depleting its energy capacity (National Renewable Energy Laboratory (NREL), 2019).

Lake Charlotte proposes to locate the BESS within the south-central portion of the Preliminary Development Area, adjacent to the Project Substation and the SMMPA Rutland Substation, and utilize an AC-coupled system. This type of system allows for efficient access, monitoring, and maintenance; has more flexible energy and power capacity sizing; and has more flexible dispatch capabilities. The preliminary design for the BESS incorporates a modular layout based on currently available technology. The location of the BESS is planned for approximately 15.9 acres in the south-central portion of the Preliminary Project Development Area, adjacent to the west side of the Project Substation.

Battery storage technology is advancing at a rapid pace and, as such, the options that may be available for the BESS when Lake Charlotte begins procuring infrastructure could be significantly more advanced or offered in a wider selection than those currently available. Lake Charlotte will analyze current market offerings during final engineering to select the specific BESS model for the Project. A variety of lithium-ion battery technologies are under review for the Project and the

preliminary design presented herein contemplates a typical BESS. A typical BESS is a model that is frequently used by similar projects. The actual footprint of the BESS may vary based on the model selected during final engineering.

The BESS will be a modular system comprised of lithium-ion batteries encased in stand-alone enclosures (refer to Figure 4.1.2-1). Standalone enclosures are necessary, as opposed to a large warehouse or storage building, to ensure people cannot enter into the battery enclosures for safety reasons as described in Section 4.1.2.1. The enclosure dimensions are anticipated to be 40 feet long by 10 feet wide by 9.5 feet high. Multiple enclosures will be utilized in tandem, and the enclosures will have a Battery Management System for automated monitoring and managing of the batteries to ensure design performance, as well as providing control for the charging/discharging of the batteries along with temperature monitoring and control of the individual battery cell temperature with an integrated cooling system.

**Figure 4.1.2-1: Typical BESS Module**

The Project will utilize approximately 192 containers at the start of the Project. It is anticipated that the BESS shall be augmented over the duration of the project life cycle (typically, every 4 to 6 years) where additional battery enclosures are added to replace degraded energy capacity. The preliminary BESS design presented herein includes space for six augmentation batteries adjacent to each BESS unit, for a total of 288 augmentation batteries. Over the life of the BESS, the batteries will lose some of their capacity. Under current MISO market rules, a BESS is accredited capacity based in part on its ability to provide the energy equivalent of its claimed capacity for a minimum of at least four continuous hours each day. To maintain the facility's rated capacity, the BESS will undergo augmentation either through the addition of battery modules within the existing enclosures or the addition of supplemental battery enclosures. The augmentation schedule to maintain overall BESS functionality will be determined during the design process after final equipment selection and will be based on the projected degradation of the batteries.

Lake Charlotte has designed the Project layout presented herein to accommodate future augmentation of BESS units within the fenced area (refer to Maps 3 and 4). Specific installation timing will vary based on capacity monitoring during operations. Accordingly, the initial construction of the BESS will not include all battery enclosures displayed on Maps 3 and 4, with augmentation units added during the life of the Project. Lake Charlotte respectfully requests the Site Permit expressly allows the addition of augmentation units, as depicted in the final site plan, without a need for a Site Permit Amendment or minor alteration approval from the Commission.

The lithium-ion batteries in each BESS enclosure operate with DC electricity that utilizes inverters, converters, and transformers to convert the electricity to AC for compatibility with the existing electrical grid. The BESS will have its own transformer and metering within the Project Substation and energy will be delivered between the Project Substation and BESS via low-voltage electrical lines that are capable of bi-directional flow. These cables will connect to pad-mounted switchgear/transformer(s), and a power distribution system that is placed adjacent to the BESS units within the BESS yard. A transformer will be located within the Project Substation that will step up or step down the AC voltage collected from or transmitted to the BESS. When injecting power into the electrical grid, AC power from the BESS will be stepped up from 34.5 kV to 161 kV before it is transmitted to the SMMPA Rutland Substation via the 161 kV gen-tie line. The voltage is required to be at 161 kV to interconnect with the SMMPA Rutland Substation and the existing electrical grid. When power from the electrical grid is transmitted to the BESS, the transformer within the Project Substation will step down the power from 161 kV to 34.5 kV before sending the power to the BESS units.

Additionally, stabilized gravel access roads will be installed between the BESS units to allow access during operation and perimeter fencing will be installed around the BESS in accordance with NESC requirements. Fencing will be placed around the BESS independently or around the BESS and the Project Substation together.

#### 4.1.2.1 BESS Safety

Lake Charlotte is committed to safety in all aspects of construction and operation of the BESS and plans to construct and operate the BESS in accordance with relevant safety codes, regulations, and industry best management practices.

Advances in technology, safety standards, and fire/building codes have and will continue to mitigate BESS fire safety risks. Strict adherence to National Fire Protection Association (NFPA) standard NFPA-855 shall be followed as related to electrical safety. Hazard mitigation systems that will be used for the Project include:

- remote monitoring (down to the cell level);
- Heating, ventilation, and air conditioning for temperature control;
- heat and smoke detection;
- automatic shutdown and personnel warnings;
- gas detection system;
- deflagration venting;

- system-specific training for local fire departments and emergency response teams; and
- A fire break between the BESS enclosures and vegetation surrounding the fenced facility.

Lake Charlotte proposes to use BESS modules for the Project from a BESS manufacturer that has incorporated all reasonable safety precautions into the design of the equipment. The lithium-ion batteries will be stored in weather-proof enclosures and each enclosure includes a fully integrated heating, ventilation, and air conditioning system for temperature control, sensors, and controls for remote monitoring, and built-in fire detection. No off-gassing or air emissions are produced in day-to-day operations.

#### 4.1.2.2 BESS Testing and Certification

Lake Charlotte is committed to partnering with equipment suppliers that manufacture to stringent quality standards, and all equipment that would be used for the Project will be tested and certified by third party professionals. Standards, certifications, and code requirements from multiple nationally recognized organizations will be required for the engineering, design, manufacture, and testing of the enclosures and equipment included in the BESS. All BESS equipment used for the Project will be tested for compliance with prominent safety standards, including International Electrotechnical Commission 62619, International Electrotechnical Commission 6244-1, Underwriters Laboratories 1973, and Underwriters Laboratories 9540A. BESS design shall comply with International Fire Code 2018, NFPA 855, and National Electric Code (NFPA 70).

#### 4.1.2.3 BESS Facility Monitoring Systems

The BESS will have a Battery Management System that will allow automated monitoring in the Project Substation control or SCADA room and managing of the batteries to ensure design performance, as well as providing control for the charging/discharging of the batteries along with temperature monitoring and control of the individual battery cell temperature with an integrated cooling system.

Each lithium-ion battery is equipped with cell level, module level, rack level, and system level monitoring. Real-time data is collected and provided to an automatic control logic housed in the Battery Management System and site controller. The Battery Management System and site controller ensure the BESS is operating within the original equipment manufacturer's operating parameters and warranty requirements. If any operating limit is exceeded, the batteries will disconnect from the system. In addition, in the event of a fire safety warning, the control system will automatically contact a fire monitoring service who will contact the local fire department. Current battery technology has also advanced so that fire risk is less prevalent. The batteries are more thermally stable and less prone to thermal runaway than batteries comprised of older battery chemistry that will not be used for the BESS.

Lake Charlotte is proposing BESS modules in separate stand-alone enclosures for the Project for safety and risk mitigation considerations. While stand-alone enclosures will require a larger footprint, they also minimize potential fire risk to the BESS as a whole as compared to other designs. An advantage of having the batteries in standalone enclosures is, if one battery were to catch fire, the fire would be contained within that enclosure and would not impact adjacent

enclosures. In addition, stand-alone enclosures only allow external access, which avoids the risk of personnel getting trapped inside of a structure if a fire occurs.

Lake Charlotte is committed to providing training resources for local emergency responders, as well as working with local emergency responders to develop a Project and site-specific Emergency Response Program. The Emergency Response Program will require bi-annual safety drills and annual safety training with local first responders. The Emergency Response Program will cover possible incidents that could occur at the BESS and include corresponding emergency procedures. Lake Charlotte will coordinate with local emergency responders to develop the Emergency Response Program prior to the commercial operation date for the Project.

### 4.1.3 Access Roads

The Solar Facility will include approximately 8.2 miles of graveled access roads (16.3 acres of gravel, which includes approximately 0.24 mile of graveled access roads (0.5 acre of gravel) associated with the BESS and Project Substation. Access roads will be used for operations and maintenance along with emergency access should any incidents occur. The final length of the access roads will depend on the equipment selected and final engineering design. Access roads will be up to 16 feet wide where straight and may widen to approximately 45 feet along curves and at internal road intersections. The preliminary Project design contemplates 6 access points to the Solar Facility from 210$^{th}$ Avenue and one access point to the BESS and Project Substation also from 210$^{th}$ Avenue to each facility. All entrances to the Solar Facility and BESS will be secured with locked gates.

Lake Charlotte has designed access roads for effective and efficient access for operations and maintenance and for safe ingress and egress of employees, visitors, and emergency responders. Lake Charlotte has minimized the amount of access roads to only the number necessary for the Project. For example, access roads reach all portions of the site and every central inverter, but not every block of panels has access roads along the entire perimeter (i.e., along the perimeter fence). This design minimizes the amount of ground disturbance and new impervious surfaces while still providing effective and efficient site access.

Upgrades or changes to public roads may be required for construction or operation of the Project. Lake Charlotte will work with the appropriate government unit that has jurisdiction over the roads to facilitate required upgrades that meet the required public standards. Upgrades or changes may include, but are not limited to, road improvements, additional aggregate, and driveway changes. Road use and improvements will be incorporated into a Development Agreement with the appropriate governmental unit. Driveway changes, access, and encroachment within a county road right-of-way will require a county entrance permit from Martin County, which will be obtained prior to construction.

### 4.1.4 Security Features

Permanent security fencing will be installed along the perimeter of the solar arrays within the Solar Facility and around the Project Substation and BESS. Fencing will be secured to posts which will be directly embedded in the soil or set in concrete foundations as required for structural integrity. The fencing around the Solar Facility will consist of an agricultural woven wire fence and will

extend approximately seven feet above grade. As typically requested by the MDNR on other projects, barbed wire will not be used around the perimeter of the Solar Facility. In place of barbed wire, one foot of three to four strands of smooth wire will be placed atop of the woven wire fence for a total height of approximately eight feet above grade. Gates will be strategically installed at corners for deer egress and contact information for the site manager will be posted at the gates.

The fencing around the Project Substation and the BESS will be a 6-foot above grade chain-link fence and include one foot of barbed wire on top to comply with the NESC. This fencing will be designed to prevent the public from gaining access to electrical equipment which could cause injury or death.

Lake Charlotte will install security cameras at entrance gates to the Solar Facility, Project Substation, and BESS. Security lighting will be installed at the entrances to the Solar Facility, Project Substation, and BESS and will be shielded and downlit in accordance with MDNR preferences for facility lighting. In addition, LED lighting will be designed to limit the maximum nominal color temperature to 4000K. The typical pole height for security lighting will be 10 feet and the lighting will be manually operated by switch as well as motion activated. Each inverter within the Solar Facility will also be downlit and switch controlled for repair purposes. For more details about the proposed lighting, see the Site Plan in Appendix B.

### 4.1.5 Associated Facilities

#### 4.1.5.1 Project Substation

The Project Substation will be a 34.5/161 kV step-up substation with metering and switching gear required to connect to the transmission grid. The Project Substation will be shared by the Solar Facility and BESS and will have separate transformers and metering for each facility. It will be designed according to regional utility practices, MISO Standards, Midwest Reliability Organization Standards, NESC, and the Rural Utility Service Code. The area within the Project Substation footprint will be graveled to minimize vegetation growth in the area and reduce fire risk. The Project Substation will be fenced with a six-foot chain-link fence, topped with one foot of barbed wire in accordance with NESC standards. Based on the preliminary design, approximately 4.7 acres will be required to construct the Project Substation.

A Spill Prevention, Control, and Countermeasures Plan is required by the EPA if any facility associated with the Project has oil storage of more than 1,320 gallons. The Project Substation will contain two industry-standard main power transformers, which will require a Spill Prevention, Control, and Countermeasures Plan. This plan will be prepared prior to the start of commercial operation.

#### 4.1.5.2 Operation and Maintenance Building

An O&M building will be shared by the Solar Facility and BESS. It will be located adjacent to the Project Substation. The O&M building will be made of metal (similar to a pole barn). It will contain an office for the onsite Plant Manager, a technician room, restroom, and storage area for equipment required for operations and maintenance. Equipment within the O&M building will include a SCADA cabinet, spare panels, spare parts for the Project Substation and BESS, and equipment to operate the Project Substation, as well as safety equipment for working with live electricity. A

permanent emergency generator or generators will be installed to be used in the case of power outage to support Project SCADA equipment. An emergency generator is typically 50KW in size and may be powered by diesel or propane.

Onsite storage at the O&M building may include hydraulic oil stored in a plastic or poly tote or 55-gallon drums on secondary containment pallets and potentially fuel tank(s), for maintenance vehicles and emergency generator(s), that would be a double walled tank with additional secondary containment, as required to meet applicable regulations. The Project Stormwater Pollution Prevention Plan (SWPPP) will describe pollution prevention measures for storage, handling and disposal of hazardous materials, solid waste, concrete and equipment wash water, portable toilets, construction products, and materials.

#### 4.1.5.3 Parking

A parking lot will be located adjacent to the O&M building. The final size will be determined in accordance with the Martin County Planning and Zoning Ordinance. The parking lot will be gravel or paved depending on the size to comply with the county parking and loading regulations.

#### 4.1.5.4 Stormwater Ponds

The preliminary design for the Project includes 48 stormwater ponds throughout the Preliminary Development Area that range in size from 0.12 to 0.78 acres (20.0 acres total; see Maps 3 and 4). These stormwater basins are generally located in existing low areas. As noted in the Vegetation Management Plan (refer to Appendix C), the area within the stormwater basins, if integrated as a permanent feature, will be vegetated with a wet seed mix that will help stabilize soils after rain events.

#### 4.1.5.5 Weather Stations

The Solar Facility and BESS will have up to six weather stations that will be up to 20 feet in height (refer to Figure 4.1.5-1). Weather stations will be within the Preliminary Development Area; the final locations will be determined during final engineering design.

**Figure 4.1.5-1: Weather Station**


### 4.1.6 Temporary Facilities

Lake Charlotte will utilize 8 temporary laydown areas within the Preliminary Development Area, totaling approximately 5.5 acres. These areas will serve both as a parking area for construction personnel and staging areas for components during construction of the Solar Facility and BESS. These laydown areas have been sited to avoid any tree clearing and wetland impacts. After construction is complete, the laydown areas will be vegetated in accordance with the Project Vegetation Management Plan and soil conditions will be restored in accordance with the Agricultural Impact Mitigation Plan.

### 4.1.7 Interconnection to the Existing Electrical Grid

The Solar Facility and BESS will both be connected to the Project Substation with separate transformers and metering. The Project Substation will be a 34.5/161 kV step-up/step-down substation with metering and switching gear required to interconnect the Solar Facility and BESS into the existing SMMPA Rutland Substation via a shared 161 kV overhead gen-tie transmission line of approximately 365.4 feet, pending final engineering design. The gen-tie transmission line will be strung from a single dead-end structure located within the Project Substation to another

dead-end structure within the SMMPA Rutland Substation. The structures will be made of wood or steel and will be less than 150 feet tall. The type of conductor will be determined following the completion of detailed electrical design.

### 4.1.8 Pipeline System

Minnesota Rules 7850.1900, subp. 1(J) is not applicable to the Project because no pipelines will be accessed or built as part of the Project.

## 4.2 Project Layout

The final layouts for the Solar Facility and BESS will optimize electrical generation, efficiency, and storage while avoiding and minimizing impacts on environmental and cultural resources and existing infrastructure. Pursuant to Minn. Stat. § 216E.10, the Site Permits issued by the Commission supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government. To the extent that they apply to the Project, the layout of the Solar Facility and BESS will also comply with other local, state, and federal regulatory standards. In addition, all MDNR buffer requirements under Minn. Stat. § 103F.48 have been met.

Review of the Martin County Zoning Map (Martin County, 2017) indicates that the Project is primarily sited in the Agriculture District, though the western boundary of the Land Control Area overlaps the Shoreland Special Protection and Shoreland Residential Recreational overlay districts that surround Lake Charlotte, Martin Lake, High Lake, and the smaller wetland areas adjacent to these lakes. Martin County adopted a Renewable Energy Ordinance (Ordinance) on July 21, 2015 (Martin County, 2015). The definition of a Solar Energy System in the Ordinance includes both solar energy generating and storage equipment; given the size of the Solar Facility and BESS, the Project is specifically considered a Large Solar Energy System according to the Ordinance. Large solar facilities are listed as a Conditional Use in the Agriculture District; however, Large Solar Energy Systems are not permitted in Shoreland Special Protection or Shoreland Residential Recreational districts (Martin County, 2015). The Martin County Renewable Energy Ordinance does not provide specific setback requirements for Large Solar Energy Systems; the Ordinance notes that the regulations of the underlying zoning district apply. Setback requirements in the Agriculture District that could be applied to the Project are provided in Table 4.2-1 (Martin County, 2008).

**Table 4.2-1 Martin County Setbacks**

| Feature | Setback Requirement to Solar Facility (feet) | Preliminary Development Area (at closest in feet)[1] | Solar Array (at closest in feet) | BESS (at closest in feet) |
|---|---|---|---|---|
| Front yard (from the centerline of public roads) | 200 | 130 | 200 | 635 |
| Side yard | 30 | 41 | 50 | 172 |
| Rear yard | 30 | 53 | 47 | 172 |

**Table 4.2-1 Martin County Setbacks**

| Feature | Setback Requirement to Solar Facility (feet) | Preliminary Development Area (at closest in feet)[1] | Solar Array (at closest in feet) | BESS (at closest in feet) |
|---|---|---|---|---|
| Centerline of County Drain Tile[2] | 75 | 0[3] | 86[3] | NA |

[1] Measurements are taken from the fence line of the Solar Facility. Note, the Martin County Zoning Ordinance does not consider fencing in its setback requirements, only structures.

[2] The County Ordinance does not have a specified setback from county drain tile. Recommended buffer distances based on tile diameter were provided by Martin County Drainage Administration.

[3] County drain tile is present within the Preliminary Development Area; therefore, no distance to county drain tile is provided. Distance between solar arrays and County drain tile is provided for the primary solar arrays; the alternate arrays are not considered.

Source: Martin County, 2008 and 2015

The preliminary design of the Project avoids and minimizes impacts on environmental and cultural resources and existing infrastructure and also complies with the setback requirements in the Martin County Zoning Ordinance for the Agriculture District. Lake Charlotte is coordinating with the Martin County and will work with the county to address any concerns it may have about the Project design and setbacks.

## 4.3 Estimated Solar Facility and BESS Acreages

Table 4.3-1 describes the estimated acreage within the 1,004-acre Preliminary Development Area based on the preliminary design for the below-ground and hybrid below-ground/above-ground electrical collection configurations. The estimated Solar Facility and BESS acreages are the same for both options.

**Table 4.3-1 Estimated Solar Facility and BESS Acreages within the Preliminary Development Area**

| Project Component | Acres |
|---|---|
| **Solar Facility** | |
| Solar Arrays [1] | 720.9 |
| Inverters | 0.2 |
| Solar Facility Access Roads | 16.3 |
| Collector Substation | 4.7 |
| O&M Building and parking lot | 0.2 |
| Laydown Yards [2] | 5.5 |
| Collection and Communication Lines [3] | 0.7 |
| Stormwater Ponds | 20.0 |
| Remaining Area within the Fenceline of the Solar Facility | 219.5 |

| Table 4.3-1 Estimated Solar Facility and BESS Acreages within the Preliminary Development Area | |
|---|---|
| **Project Component** | **Acres** |
| **Solar Facility Subtotal** | **988.1** |
| **BESS** | |
| BESS Units and Graveled Area | 7.6 |
| BESS Access Roads | 1.7 |
| Additional Temporary Workspace | 3.6 |
| Laydown Yard | 1.9 |
| Stormwater Pond | 1.1 |
| **BESS Subtotal** | **15.9** |
| **PROJECT TOTAL** | **1,004.0** |

[1] The acreage presented includes the primary and alternate arrays; therefore, total acres are overstated. Also, the impacts associated with solar panels include an approximate 19-foot-wide grass area between every row of panels.

[2] The laydown yards are only used during construction and result in temporary impacts.

[3] Acreage provided for collection and communication lines includes only the areas where these facilities extend outside of the fence line of the Solar Facility.

## 4.4 Construction

A variety of activities must be completed to carry the Solar Facility and BESS through construction. Below is a preliminary list of activities necessary to develop the Project.

Pre-construction, construction, and post-construction activities for the Solar Facility include:

- Pre-construction
  - Geotechnical analysis
  - Design substation and electrical collection system
  - Design solar array, access roads, and O&M building
  - Underground utility discovery
  - Procure all necessary facility components (solar panels, tracking system, transformers).
  - Implement management techniques as prescribed in the Vegetation Management Plan and determine the permanent seeding management approach (prior to solar installation or following solar installation) and determine if temporary seeding of cover crop is applicable based upon timing.
- Construction
  - Gopher One Locate
  - Staking
  - Site preparation, grubbing, and grading

  - Construct laydown areas and set up temporary job site trailers
  - Construct fencing
  - Civil construction of access roads
  - Install PV mounting posts
  - Install below-ground or hybrid collection system
  - Install electrical enclosure/inverter
  - Tracker installation
  - PV panel installation
  - Construct gen-tie line
- Post-construction
  - Restore disturbed areas not intended for permanent above-ground facilities. Permanent above-ground facilities include the substation, O&M building, inverter skids and electrical cabinets, and access roads;
  - Implement vegetation management to control invasive or noxious species, perennial weeds, problematic native species or woody species etc. in accordance with the Vegetation Management Plan;
  - Implement vegetation monitoring in accordance with the Vegetation Management Plan;
  - Test facility; and
  - Begin commercial production.

Pre-construction, construction, and post-construction activities for the BESS include:

- Pre-construction
  - Geotechnical investigation:
  - Underground utility identification and location;
  - Initiate soil/vegetation stabilization in areas with no disturbance;
  - Design BESS; and
  - Procure necessary facility components (BESS inverters, storage devices/containers, emergency generators).
- Construction
  - Gopher One Locate
  - Staking
  - Site preparation, grubbing, and grading
  - Maintain perennial vegetation established during preconstruction activities
  - Establish temporary or permanent (seasonally dependent) vegetation in disturbed areas, as practical

  - Civil construction of access roads
  - Construct fencing
  - Install BESS foundation
  - Install BESS components and electrical connection to the Project Substation
- Post-construction
  - Restore disturbed areas not intended for permanent above-ground facilities
  - Maintain and restore established vegetation as per the Vegetation Management Plan
  - Replace temporary vegetation with perennial vegetation as applicable
  - Test BESS
  - Begin commercial operation

### 4.4.1 Solar Facility Construction Activities

During construction, equipment and work vehicles will travel to and from the site. Portions of the Preliminary Development Area will require grading. Typical construction equipment such as scrapers, dozers, dump trucks, watering trucks, motor graders, vibratory compactors and pile drivers, pickup trucks, and backhoes will be used during construction. Specialty construction equipment that may be used during construction will include:

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

Upon completion of construction, heavy equipment will be removed from the site. An overview of construction activities follows.

#### 4.4.1.1 Geotechnical

Geotechnical and pull testing studies will be performed to determine the topsoil and subsoil types, and the mechanical properties of the soils. These variables will be used to engineer the solar array foundation system.

#### 4.4.1.2 Site Clearing and Vegetation Removal

After the necessary permits are received, construction will begin with the initial site preparation work, including utility locates. Depending on timing of the start of construction, the Solar Facility may require the clearing of residual row-crop debris from the previous seasons. Alternatively, and depending on construction timing, Lake Charlotte may plant a cover crop that is compatible with

the Project Vegetation Management Plan (refer to Appendix C). This cover crop will stabilize soils where row crops or other vegetation are not present.

#### 4.4.1.3 Earthwork

Areas of the site to be graded will have topsoil and organic matter stripped and segregated from the subsoil (depending on the depth of grading cut) in accordance with the Agricultural Impact Mitigation Plan, as described further in Section 5.3.1. Some grading will be required to provide a more level workspace and maintain soil stability in areas with a slope greater than five percent. Topsoil shall have temporary and permanent erosion control and soil stabilization measures established in accordance with the SWPPP. The earthwork activities will be completed using typical civil construction equipment, such as scrapers, bulldozers, front-end loaders, back-hoes, or skid-steers.

#### 4.4.1.4 Access Road Construction

As a component of earthwork, permanent access roads and permanent turnouts will be developed. This work will start with the stripping and segregating of topsoil materials from the anticipated 16-foot-wide road width. Topsoil removed from permanent access roads will be removed to suitable locations near the site of removal and spread across existing topsoil for storage. Storage locations will be identified (Global Positioning System [GPS] boundary and depth) and recorded on site maps to facilitate final reclamation after decommissioning. The subgrade materials will be compacted 16-foot-wide to the specified compaction requirements as laid out by the civil and geotechnical engineer. After compaction is reached and verified, the road will be installed as designed, typically done with or without geo-fabric depending on the soil type, and then, with a surface of 4 to 12 inches of gravel. The gravel will be placed level with the existing grade to facilitate drainage and minimize ponding.

After gravel is installed and compacted to the engineers' requirements, drainage ditches will be shaped as identified on the final grading plan. Finally, the previously stripped and windrowed topsoil material will be re-spread throughout the Solar Facility.

#### 4.4.1.5 Solar Array Construction

Once grading activities are complete, the racking system supports will be constructed using steel piles driven into the ground. The solar facilities will be constructed in blocks, and multiple blocks could be constructed simultaneously. Construction of the blocks will include pre-positioning and driving piles, mounting the tracking rack system to the piles, pre-positioning of panel pallets, mounting panels to the tracking rack system, the completion of electrical connections, terminations and grounding, and installation of cable management systems. In some situations where soils are low strength or consist of loose, non-cohesive sand, helical screw or auger-type foundation posts may be used. Helical screw or auger-type foundation posts are not anticipated; however, final determinations will be made after the geotechnical work is completed. Foundations are typically steel and are used where high load bearing capacities are required. The pile is driven using a hydraulic ram that moves along tracks and is operated by two workers. Soil disturbance will be restricted to the hydraulic ram/screw machinery, about the size of a small tractor, temporarily disturbing soil at each pile insertion location and while driving between drilling locations.

The remainder of the tracking rack system will be installed by construction crews using hand tools and all-terrain tracked equipment to distribute materials. Array racking will be bolted on top of the foundation piling to create a "rack" to which the solar panels can be fastened.

During array and racking assembly, multiple crews and various types of vehicles will be working within the Project area. To the extent practicable, vehicular traffic will be limited to permanent and temporary access roads to minimize soil disturbance, mixing, and compaction; however, vehicular traffic will occur off of roads throughout the Project during construction. Off-road construction vehicles include flatbed trucks for transporting array components, small all-terrain vehicles, rough-terrain forklifts and skid-steers, as well as pick-up trucks for transporting equipment and workers throughout the Preliminary Development Area. Panels will be staged in advance throughout the Preliminary Development Area and brought to specific work areas for installation by wagon-type trailers pulled by small tractors or by all-terrain tracked equipment. The solar panels will be installed by multiple crews using hand tools. Installation crews will proceed in serpentine fashion along staked temporary access roads in a pre-established route to minimize off-road traffic.

#### 4.4.1.6 Electrical Collection System

Electrical wiring will connect the solar panels to inverters, which will convert the power from DC to AC. The AC will be stepped up through a transformer from the inverter output voltage to 34.5 kV and brought via the collection cables to the Project substation. These cables may be installed in a below-ground system or hybrid above-ground / below-ground system (refer to Section 4.1.1.2). Directional boring will be used during construction where the electrical collection and communication lines are located within wetlands and the lines will be located below ground. In addition, electrical cables connecting blocks of solar arrays will be directionally bored under public roadways.

A below-ground collection system will involve the installation of all cables in trenches or ploughed into place at a depth of approximately four feet below grade. During trench excavation, the topsoil and subsoil will be removed and stockpiled separately in accordance with the Agricultural Impact Mitigation Plan. Once the cables are laid in the trench, the area will be backfilled with subsoil followed by topsoil.

If a hybrid option is selected and above-ground cabling is utilized, the DC collection cables will be strung under each row of panels on steel arms and a steel cable attached to the piles. At the end of each row, hanging brackets would connect several racks/rows of cables to a common collection point near their assigned inverter/transformer skid where the cables will be routed below-ground at a minimum depth of approximately four feet below grade to the inverter/transformer skid where the current is converted to AC and voltage is stepped up to 34.5 kV. From the inverter/transformer skid, the AC collection would be installed below ground to the collector substation, as described above for the below-ground collection system.

The electrical collection system will be site-specific depending on geotechnical analysis, constructability, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system.

#### 4.4.1.7 Project Substation Construction

Construction work within the substation site will include site preparation and installation of substructures and electrical equipment. Installation of concrete foundations and embedment for equipment will require the use of trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. Above-ground and below-ground conduits from this equipment will run to a control enclosure that will house the protection, control, and automation relay panels. A station service transformer will be installed for primary AC power requirements. Batteries and battery chargers will be installed inside the enclosure for auxiliary power to the switchyard's control system. Crushed rock will cover the area of the substation and adequate lighting will be installed around the substation for worker safety during construction and operation.

One of two methods will be used to install substation foundations. Option 1 would be to use a small rubber tire backhoe to dig out major foundations prior to pouring the concrete slabs. Option 2 would use an auger/drill type machine for minor foundations.

In both scenarios, the limit of disturbance will be within the footprint of the substation for both the foundation equipment and the concrete delivery trucks. All topsoil from the substation footprint will be removed to a pre-established suitable location for storage. The storage area will be near the site where the soil was removed, accurately located (GPS boundary, soil depth), and graded to facilitate revegetation. Subsoil will be removed, if necessary, to an acceptable pre-established and approved area for storage. After decommissioning, subsoil will be returned to the area from which it was excavated (as needed), topsoil will be replaced, and the area will be brought back to pre-construction contours.

### 4.4.2 BESS Construction Activities

After the necessary permits are received, construction will begin with the initial site preparation work, including utility locates. Construction of the BESS will begin with grading and site leveling. Topsoil will be segregated and placed in a designated location. Construction of the BESS will require grading of approximately 15.9 acres. Lake Charlotte does not anticipate soil removal for construction of the BESS due to the existing, relatively flat topography.

Site preparation will include installation of substructures and electrical equipment. Installation of concrete and steel pile foundations and embedment for equipment will require the use of trenching machines, excavators, concrete trucks, pumpers, vibrators, forklifts, and cranes. Medium-voltage cables will be installed below ground between the power conversion systems and the Project Substation. The BESS will include individual BESS containers, inverters (or power conversion systems), switchboards, low voltage cabling, medium voltage switchgear, a junction box, and medium voltage transformers. A fire alarm system will be integrated into the BESS to help identify and communicate any alarms and give proper notification to the operations team.

Each equipment enclosure (power conversion system and BESS containers) will be installed on a foundation designed to support its weight based on regional soil conditions. These foundations will either be steel-reinforced concrete slabs or steel pile foundations. For BESS foundations, two installation methods are commonly used: Steel Pile Installation or Excavation and Concrete Pouring. For concrete foundations, a small excavator would be used to dig the major foundation

areas before pouring the concrete slabs. For Steel Pile Installation, a pile driver embeds steel piles to create a foundation on which the enclosures can be set and attached.

The power conversion system and BESS containers will be transported to the site on flatbed semi-trailers and placed on the foundations using an overhead crane. The containers will then be secured and fastened to the concrete pads or steel piles with anchor bolts. Crushed rock will be placed between and around installed BESS equipment. Adequate lighting will be installed around the BESS site for worker safety during construction and operation. Lighting will be downlit and controlled via timers, sensors, and switches to limit light usage to the extent necessary to meet safety and security requirements.

### 4.4.3 Construction Management

Lake Charlotte will designate an on-site construction manager that will oversee the Solar Facility and BESS construction. This manager's responsibilities will include scheduling and coordinating the activities of engineering, procurement, and construction contractors. The construction manager will be supported by other members of Lake Charlotte's team who specialize in engineering, permitting, meteorology, environmental compliance, real estate, and geographic information systems (GIS) mapping.

Throughout the construction phase, ongoing coordination will occur between the development, design, and construction teams. The construction manager will coordinate execution of the work. This coordination includes safety and quality control programs, cost, and schedule forecasting, as well as site security and ongoing communication with local officials, citizen groups, and landowners.

### 4.4.4 Commissioning

The Solar Facility and BESS will undergo equipment inspection and testing prior to beginning commercial operations and in compliance with Site Permit requirements. Individual and combined inspection and testing will occur for each component of the Solar Facility and BESS. These components include, but are not limited to, the solar array; associated communication, meteorological, collection, SCADA systems; battery modules; and BESS on-board monitoring systems. Testing, inspections, and commissioning will occur periodically during construction and upon completion of the construction phase.

### 4.4.5 Restoration

As portions of the Project near completion, temporary staging and laydown areas and other temporary disturbance areas within the Preliminary Development Area will be restored in accordance with the Vegetation Management Plan (refer to Appendix C). Topsoil will be spread and the Project will be graded to natural contours, where possible, and soil will be de-compacted in accordance with the Project Agricultural Impact Mitigation Plan (refer to Appendix E). Lake Charlotte anticipates that the post-construction clean-up and site restoration activities will take approximately 2 to 4 months.

Disturbed areas will be reseeded and re-vegetated with specific seed mixes in accordance with the Vegetation Management Plan (refer to Appendix C) and the Project SWPPP. Seed mixes will be

designed to be used with the vegetation management practices of periodic mowing, grazing, and selective spot herbicide applications. All areas that will not contain permanent facilities (i.e., the area under the arrays, the laydown yards, and the stormwater basins) will be stabilized with erosion control measures, such as silt fence, sediment control logs, temporary seeding, and mulching as needed until permanent vegetation has been established. Additionally, a temporary cover crop will be planted with the perennial seed mixes to stabilize the soil and prevent erosion during the time it takes for the seeds to establish.

Lake Charlotte anticipates that the short-term establishment practices will occur from years 0 through 5, with long-term maintenance practices occurring from year 6 onward. Vegetation is expected to be fully established during the sixth growing season after native seed mix is planted. The long-term goal is to vegetate 95 percent of the Project site with at least 90 percent of the species being native. Additional short- and long-term goals are discussed within the Vegetation Management Plan (refer to Appendix C).

The Vegetation Management Plan provides a guide to site preparation, installation of prescribed seed mixes, management of invasive species and noxious weeds, and control of erosion/sedimentation. The required restoration management is designed to continue for 5 years. The Vegetation Management Plan outlines vegetation management tasks during the establishment and perpetual maintenance phases including monitoring for and treating invasive species, mowing, and re-seeding.

The Project will use an adaptive management approach for vegetation management as outlined in the Vegetation Management Plan. Monitoring vegetation during the active growing season (May to September) is a key aspect of adaptive management and will be useful in identifying issues, tracking progress, and reevaluating management needs.

The Vegetation Management Plan outlines several vegetation maintenance strategies that may be implemented at the Project including mowing, herbicide use, and grazing. Mowing may be used when vegetation reaches a height of approximately 18 to 24 inches initially to bring it back to a height of roughly 6 to 9 inches and will help control weed species until natives become established. Mowing will continue as prescribed by the Vegetation Management Plan. Herbicides will be employed where it is determined that mowing alone will not accomplish perennial weed control. Alternatively, livestock (e.g. sheep or goats) may be used experimentally where grazing proves to be a more viable long-term management strategy.

## 4.5 Solar Facility and BESS Operation and Maintenance

Following commissioning and commercial operation, the care, custody, and control of the facility will transfer from the construction team to the operations staff. The construction manager will work with the operations staff, the equipment suppliers, and other construction and maintenance personnel to ensure a smooth transition from the start of construction to commercial operation. The operations staff will have full responsibility for the facility to ensure operations and maintenance are conducted in compliance with approved permits, prudent industry practice, and the equipment manufacturer’s recommendations.

The Solar Facility and BESS will be professionally maintained and operated by Lake Charlotte, an affiliate, or contractor. Primary tasks include scheduled monthly and quarterly inspection(s) of electrical equipment, vegetation management, and snow removal on access drives.

The expected service life of the Solar Facility and BESS is 30 years. At the end of 30 years, should Lake Charlotte desire to extend operations, it would apply for amendments to the Site Permits to allow continued operation of the Solar Facility and BESS. Should Lake Charlotte decide to continue operation, a decision would be made as to whether existing equipment could be used or if upgrades with newer technologies are required.

The Solar Facility and BESS will be operated and maintained in tandem, using the same staff. It is estimated that three to four full-time permanent positions will be required to operate and maintain the Solar Facility and one to two full-time permanent positions to operate and maintain BESS. A maintenance plan will be created for both facilities to ensure safe and efficient performance, including a scheduled check of the main items and a predictive maintenance approach of the devices subjected to derating / degradation. Derating / degradation refers to the known process of components losing some efficiency or otherwise degrading over the course of the Project life cycle. Like all technology and physical components, a certain amount of this is unavoidable, and Lake Charlotte will plan for it and maintain the facility as needed. Once construction is complete, three to ten trucks will be on site daily, and at intervals associated with the maintenance schedule in Section 4.5.4 during normal operations. The main scheduled activities are described in more detail below in Sections 4.5.1 through 4.5.4.

All maintenance activities for the Solar Facility and BESS will be performed by qualified personnel. Maintenance activities will be performed during the day to the extent that they do not disrupt energy production. As an example, if a panel needs repair, that particular section of the array can be disconnected from the array by opening the combiner box circuit. The panel can then be replaced, and the combiner box circuit closed. Additionally, the power production circuits are separated from the tracking circuits. This allows the PV panels to operate during an unscheduled outage of the tracker system. On occasion, it may be desirable to perform maintenance when the sun is down. Activities that have the potential for substantial noise generation will be performed during the day to minimize impacts in areas where residents are present. Approved technicians will service the BESS units and associated equipment once per month. A performance audit and inspection to assess the quality of equipment will be conducted annually. If any equipment needs to be replaced before the Projects' end-of-life, the Applicants will reuse, recycle, or dispose of equipment in accordance with applicable regulations and best management practices.

There will be an area for the storage of the spare parts and the tools as described in Section 4.1.5.2. The generating facility will be operated through a real-time control system for most operations functions.

### 4.5.1 Supervisory Control and Data Acquisition System and Battery Management System

Performance monitoring will consist of a real-time and continuous collection of data acquired by the onsite meteorological station, energy meter, and SCADA. The SCADA system provides data on solar energy generation and production, availability, meteorology, and communications. The

solar modules will communicate directly with the SCADA system for remote performance monitoring, energy reporting, and troubleshooting. Operators will be notified immediately of any abnormalities allowing for timely corrective action regardless of the time of day.

The BESS will have a Battery Management System that will allow automated monitoring and managing of the batteries to ensure design performance, as well as provide control for the charging/discharging of the batteries along with temperature monitoring and control of the individual battery cell temperature with an integrated cooling system.

Performance monitoring of the Solar Facility and BESS will consist of a weekly or monthly download of the data acquired by the onsite meteorological stations and SCADA system (energy produced, alarms, faults, etc.) and the Battery Management System.

### 4.5.2 Equipment Inspection

Inspection of the main equipment will occur at regular intervals, including:

- Photovoltaic panels: visual check of the panels, tracking system and surrounding grounds to verify the integrity of the panels and tracking structure, the presence of animals and nests, etc.;
- Inverters, transformers, and electrical panels: visual check of the devices including the connection cabinet and the grounding network. Check for presence of water and dust;
- BESS: Performance verification, check of air filters, heating, ventilation, and air conditioning system, and fire suppression systems;
- Electrical check: measurement of the insulation level and dispersion. Check of the main switches and safety devices (fuses);
- Noise: check of abnormal sounds;
- Cabling and wiring: visual check of the buried and aerial electrical line and connection box to verify their status.
- Gen-tie line, structures, and components: Routine visual inspection (maintenance of structures may be performed by other parties); and
- Project Substation: Scheduled visual inspections.

### 4.5.3 Facility Maintenance

Housekeeping of the Solar Facility and BESS will include road maintenance, vegetation maintenance (method is to be determined; either traditional mowing or livestock grazers will be utilized), fence and gate inspection, lighting system checks, and photovoltaic panel washing (if required; minimal to no washing is anticipated to be needed at the Project facilities due to the naturally occurring and frequent precipitation). When snowfall occurs, the Solar Facility's tracking systems will aid in snow removal from the panels.

### 4.5.4 Maintenance Schedule

Table 4.5.4-1 provides information on the anticipated frequency of the operations and maintenance tasks. The table represents the anticipated preliminary frequency of these tasks. The frequency of inspection may vary based on facility demands and experience with performance of certain components and systems.

**Table 4.5.4-1 Operations and Maintenance Tasks and Frequency**

| Plant Device | Task | Preliminary Frequency |
|---|---|---|
| Photovoltaic Field | Photovoltaic Panels visual check | Once Yearly |
| | Wirings and junction boxes visual check | Once Yearly |
| | PV strings measurement of the insulation | Once Yearly |
| | Advanced diagnostics | At Owner's Direction |
| | Overview aerial thermal scan | Once Yearly |
| | PV strings and string boxes faults | Once Yearly |
| | PV panels washing | No regular washing planned (only as site-specific conditions warrant) |
| | Vegetation Management (if necessary at site) | Up to three times a year depending on site conditions |
| BESS | System Visual Inspection | Quarterly |
| | Filter Inspection | Quarterly |
| | Fire Safety system Inspection and Maintenance | Once Yearly |
| Electric Boards | Case visual check | Once Yearly |
| | Fuses check | Once Yearly |
| | Surge arresters check | Once Yearly |
| | Torque check | Once Yearly |
| | DC voltage and current check | Once Yearly |
| | Grounding check | Once Yearly |
| Inverter | Case visual inspection | Once Yearly |
| | Air intake and filters inspections | Once Yearly |
| | Conversion stop for lack of voltage | Once yearly |
| | AC voltage and current check | Once yearly |
| | Conversion efficiency inspection | Once yearly |
| | Datalogger memory download | Once yearly |
| | Fuses check | Once yearly |
| | Grounding check | Once yearly |
| | Torque check | Once yearly |
| Support Structures | Visual check | Once yearly |

| Table 4.5.4-1 Operations and Maintenance Tasks and Frequency | | |
|---|---|---|
| **Plant Device** | **Task** | **Preliminary Frequency** |
| | PV panels toque check on random sample | Once yearly |

## 4.6 Decommissioning

The Project anticipates operating the Project for 30 years or until the Site Permit expires. At the end of commercial operation, Lake Charlotte will be responsible for removing all solar modules, BESS units, and other associated facilities. At the end of the term for each Site Permit, Lake Charlotte may apply for an extension of the Site Permits and continue operation if approved. Should Lake Charlotte decide to continue operation, a decision would be made as to whether operations would continue with the existing equipment or to upgrade the facilities with newer technologies.

Lake Charlotte will abide by the applicable Site Permit condition(s) and ensure the Project is decommissioned in accordance with the Site Permit and the Decommissioning Plan. Decommissioning would include removing the solar panels, solar panel racking, steel foundation posts and beams inverters, transformers, overhead and shallow underground cables and lines, equipment pads and foundations, equipment cabinets and ancillary facilities, Project Substation, BESS, O&M Building and parking area as well as civil facilities such as fencing, access roads, and drainage features. Below-ground components, including foundations, will be removed to a minimum depth of 48 inches as discussed below (refer to Section 4.6.2). The underground cables around equipment pads will be completely removed up to a length of 25 feet around the perimeter of the pads. In addition, steel foundation posts will be pulled out to full depth. Standard decommissioning practices will be used, including dismantling and repurposing, salvaging/recycling or disposing of the solar energy and battery improvements, and restoration. In accordance with the anticipated Site Permit conditions, 90 days prior to the start of the decommission, notice will be sent in writing to the Commission, landowners, affected parties, and county and local units of government. These parties will again be notified once decommissioning activities have been completed. A detailed draft Decommissioning Plan is provided in Appendix F and is generally summarized below.

### 4.6.1 Timeline

Decommissioning is estimated to take 60 to 70 weeks to complete, and the decommissioning crew will ensure that all equipment is recycled or disposed of properly.

### 4.6.2 Removal and Disposal of Solar Facility and BESS Components

The removal and disposal details of the Solar Facility and BESS components are found below:

- Modules: Modules will be inspected for physical damage, tested for functionality, and disconnected and removed from racking. Functioning modules will be packed, palletized, and shipped to an offsite facility for reuse or resale. Non-functioning modules will be packed, palletized and shipped to the manufacturer or a third party for recycling or disposal (refer to Section 4.7.1).

- Racking: Racking and racking components will be disassembled and removed from the steel foundation posts, processed to appropriate size, and sent to a metal recycling facility.
- Steel Foundation Posts: Structural foundation steel posts will be pulled out to full depth, removed, processed to appropriate size, and shipped to a metal recycling facility. The posts can be removed using backhoes or similar equipment. During decommissioning, the area around the foundation posts may be compacted by equipment and, if compacted, the area will be de- compacted in a manner to adequately restore the topsoil and sub-grade material to a density consistent for vegetation.
- Overhead and Underground Cables and Lines: All underground cables and conduits will be removed to a depth of 48 inches. Facilities deeper than 48 inches may remain in place. Underground cables around equipment pads will be completely removed up to a length of 25 feet around the perimeter of pads. Topsoil will be segregated and stockpiled for later use prior to any excavation and the subsurface soils will be staged next to the excavation. The subgrade will be compacted per standards. Topsoil will be redistributed across the disturbed area. The steel transmission poles will be felled within the transmission line right of way and any hardware, bracing, and attachments will be transported along with the poles to a recycling facility. Removed pole locations will be revegetated with a seed mix specified in the approved Stormwater Pollution Prevention Plan and Vegetation Management Plan.
- BESS Facility: The BESS will be fully discharged to the minimum state of charge required for removal and safe transportation as per battery manufacturer specifications. The battery modules will be removed from their racks, repackaged on site, and shipped intact to a regional recycling hub within 500 miles of the Project. No disassembly of battery modules will be required on-site. All applicable requirements related to the packaging, labelling, transportation, and disposal or recycling of the lithium-ion batteries will be followed during the decommissioning process. All electrical equipment will be disconnected and disassembled. All parts will be removed from the site and reconditioned and reused, sold as scrap, recycled or disposed of appropriately, at the Project Owner's sole discretion, consistent with applicable regulations and industry standards. Gravel aggregate will be removed and shipped from the Project site to be reused, sold, or disposed of appropriately consistent with applicable regulations and industry standards. Clean aggregate can often be used as "daily cover" at landfills for no disposal cost. All internal service roads are constructed with or without geotextile fabric (depending on the results of the geotechnical analysis) and a minimum of eight inches of aggregate over compacted subgrade. All pile foundations will be pulled out completely. Underground cables and duct banks will be removed to a depth of four feet. Topsoil will be reapplied to the disturbed area. Soil will be de-compacted, and the site will be restored to the pre-construction condition and re-vegetated in accordance with the Stormwater Pollution Prevention Plan and / or construction stormwater permits.
- Inverters, Transformers, and Ancillary Equipment: All electrical equipment will be disconnected and disassembled. All parts will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at Lake Charlotte's sole discretion, consistent with applicable regulations and industry standards.

- Equipment Foundation and Ancillary Foundations: The ancillary foundation for the Project are pile foundations for both equipment skids. As described for the solar array steel foundation posts, the foundation piles will be pulled out completely. Duct banks will be excavated to a depth of at least 48 inches. All unexcavated areas compacted by equipment used for decommissioning will be de-compacted in a manner to adequately restore the topsoil and sub-grade material to a density similar to the surrounding soils. All materials will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at Lake Charlotte's sole discretion, consistent with applicable regulations and industry standards.
- Fence: All fence parts and foundations will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at Lake Charlottes's sole discretion, consistent with applicable regulations and industry standards. Fence posts can be pulled out using skid-steer loaders or other light equipment. The surrounding areas will be restored to pre-construction conditions to the extent feasible.
- Access Roads: Facility access roads will be used for decommissioning purposes, after which removal of roads will be discussed with the landowner, using the following process:
    - After final clean-up, roads may be left intact through mutual agreement of the landowner and Lake Charlotte unless otherwise restricted by federal, state, or local regulations; and
    - If a road is removed, aggregate will be excavated and loaded in dump trucks using front loaders, backhoes, or other suitable excavation equipment, and shipped from the site to be reused, sold, or disposed of appropriately at the Owner's sole discretion, consistent with applicable regulations and industry standards. Clean aggregate can often be used as "daily cover" at landfills for no disposal cost. Another disposal option is to provide the aggregate to local landowners as clean fill. All internal service roads are constructed with or without geotextile fabric and a minimum of eight inches of aggregate over compacted subgrade. Any ditch crossing connecting access road to public roads will be removed unless the landowner requests it remain. The subgrade will be de-compacted in a manner to adequately restore the topsoil and subgrade material to a density consistent for reintroduction of farming. Topsoil that was stockpiled during the original construction will be distributed across the open area. Finally, the access road corridors will be tilled to an agricultural condition.
- Substation: Decommissioning of the collector substation will be performed with the rest of the Project. All steel, conductors, switches, transformers, and other components of the substation will be disassembled and taken off site to be recycled or reused. Foundations and underground components will be removed to a depth of 48 inches. The rock base will be removed using bulldozers and backhoes or front loaders. The material will be hauled from the site using dump trucks to be recycled or disposed at an off-site facility. Additionally, any permanent stormwater treatment facilities (e.g., infiltration ponds and engineered drainage swales) will be removed. Topsoil will be reapplied to match the surrounding grade to preserve existing drainage patterns. Topsoil and subsoil will be de-compacted in a manner to adequately restore the topsoil and sub-grade material to a density consistent for reintroduction of farming.

- O&M Building: If the building is not repurposed, decommissioning will include disconnection of the utilities and demolition of the building structure, foundation, rock base parking lot, and associated vegetated/stormwater handling facilities. All associated materials will be removed from the site. All recyclable materials will be taken to appropriate facilities and sold; the remaining materials will be disposed of at an approved landfill facility. Subgrade soils will be de-compacted in a manner to adequately restore the topsoil and sub-grade material to a density consistent for reintroduction of farming. Topsoil will be reapplied to match existing surrounding grade to preserve existing drainage patterns, and the site will be tilled to a farmable condition.

### 4.6.3 Restoration/Reclamation of Facility Site

Lake Charlotte will restore and reclaim the Solar Facility, BESS Facility, and associated equipment and facilities to pre-construction conditions consistent with the requirements of the lease agreements, Agricultural Impact Mitigation Plan, and Vegetation Management Plan, and Decommissioning Plan as applicable. Lake Charlotte assumes that the Preliminary Development Area, currently estimated at 988.1 acres for the Solar Facility and 15.9 acres for the BESS, will be returned to farmland and/or pasture after decommissioning and will implement appropriate measures to facilitate such uses. Areas that consisted of non-agricultural vegetation prior to construction of the Project will be restored and reseeded to match pre-construction conditions to the greatest extent possible. If no specific use is identified, Lake Charlotte will plant unvegetated portions of the site with a seed mix specified in the approved SWPPP Agricultural Impact Mitigation Plan, and Vegetation Management Plan, as applicable. The decommissioning effort will implement construction stormwater best management practices to minimize erosion and to contain sediment on the Project to the extent practicable.

### 4.6.4 Financial Resource Plan

Lake Charlotte will be responsible for all costs to decommission the Solar Facility and BESS. Due to the uncertainty in future decommissioning costs and salvage values, Lake Charlotte will review and update the decommission estimate every 5 years or anytime there is a change in ownership as described in the draft Decommissioning Plan included in Appendix F. A Financial Assurance in the form of an escrow account or surety bond equal to 125 percent of the costs to ensure proper decommissioning will be provided, with Martin County listed as the beneficiary. Under DOC Energy Environmental Review and Analysis recommendations, a Financial Assurance is not required during the first ten (10) years of operation; however, a bond or other financial assurance will be posted no later than the 10th anniversary from the Commercial Operation Date of the Project.

## 4.7 Facility Recycling

### 4.7.1 Solar Facility

Solar modules typically consist of glass, aluminum, copper, silver, and semiconductor materials that can be successfully recovered and reused. By weight, more than 80 percent of a typical solar module is glass and aluminum, which are common and easy to recycle materials. Other module components that can be successfully recovered are copper, silver, and semiconductor materials.

More than 90 percent of semiconductor material and glass can be reused in new modules and products. While the solar modules and equipment used for the Project are expected to last for at least 30 years, at some point, they will need to be safely managed as waste products. Numerous research and development organizations, producers, academia, reuse service providers, and recycling and waste management companies work to develop end-of-life solutions for solar modules and equipment. One organization, the Solar Energy Industries Association has been actively seeking and developing solar module and associated equipment recycling partners across the U.S. since 2016.

While a majority of the solar module is comprised of glass and aluminum, which are not hazardous, different varieties of solar modules have different metals present in the semiconductor and solder material. If these metals are present in high enough quantities in the solar modules, solar module waste could be a hazardous waste under the Resource Conservation and Recovery Act (EPA, 2024c). The most common reason that solar modules would be determined to be hazardous waste would be by meeting the characteristic of toxicity, which must be managed properly Minnesota Pollution Control Agency [MPCA], 2023a).

Many manufacturers of modules are taking proactive actions to determine the potential for the metals contained in modules to leach from the panels during operation of the module or if it is broken into pieces. Each of the manufacturers being considered to provide modules completes testing for hazardous substances; the manufacturers have confirmed that no hazardous substances are leached from the tested products resulting in leachate concentrations that exceed regulatory standards. Considering the modules are fully encapsulated, unlikely to shatter, and not expected to leach hazardous materials into the environment, the risk to the environment from the contents of the modules will be minimal. If a module is broken at the Solar Facility, the broken pieces and the remainder of the module will be recycled or disposed of and replaced, thereby further reducing the risk for hazardous materials contained in the modules to leach into the environment.

According to Solar Energy Industries Association, a recycling network exists that ensures a clean energy economy remains sustainable for years to come (Solar Energy Industries Association, 2024). By the end of the useful life of the modules used for the Project, it is anticipated that module recycling will be sufficiently established in Minnesota or surrounding states to recycle the solar modules and associated equipment used for the Project.

### 4.7.2 BESS

Lithium-ion batteries are rechargeable batteries that consist of cells containing an anode layer, a cathode layer, and a separator, all in contact with an electrolyte. These batteries come in various chemistries, such as lithium cobalt oxide, lithium nickel manganese cobalt oxide, and lithium iron phosphate, each with different characteristics in terms of energy capacity, stability, recharge speed, and longevity. Common materials used in these batteries include lithium, nickel, cobalt, manganese, graphite, iron, copper, and aluminum foils (EPA, 2023).

When lithium-ion batteries reach the end of their life cycle, they are often considered hazardous waste due to the potential for fire or explosion if not handled properly. Properly recycling these batteries is crucial for safety and to conserve critical minerals and valuable materials used in their production. The recycling process typically involves collecting, sorting, and shredding the

batteries to recover materials like black mass, copper, aluminum foils, separators, and electrolytes. These recovered materials can then be processed through heat-based smelting or liquid-based leaching to extract metals like cobalt, nickel, and lithium for reuse in new batteries. The EPA is planning to propose new rules for recycling lithium batteries with hopes to improve the management of materials (EPA, 2023). These new rules for improving the recycling process of lithium-ion batteries are expected to be in place by the end of the useful life of the BESS.

In addition to recycling, there is a growing focus on battery reuse and repurpose as environmentally friendly alternatives to recycling or disposal. Used lithium-ion batteries can still provide useful energy storage for other applications even after their performance degrades. Reuse and repurpose options are being developed to give batteries a "second life," extending their usefulness before they are eventually recycled. These practices not only benefit the environment by reducing resource demands for new batteries but also contribute to a more sustainable approach to managing lithium-ion battery waste. Lake Charlotte anticipates that by the end of the useful life of the BESS, there may be more opportunities for lithium battery reuse and repurposing options.

## 4.8 Repowering

As the solar and battery markets continue to produce less expensive and more efficient solar modules and batteries, repowering the Project may be a viable option as the Solar Facility and BESS age. 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. Lake Charlotte will continually evaluate the generation output, maintenance costs, and other contributing factors in conjunction with available technology upgrades to determine if repowering is a worthwhile investment. Any proposed repowering will abide by all local, state, and federal regulations. New or amended Site Permit applications may be necessary.

# 5.0 ENVIRONMENTAL INFORMATION

The description of the existing environment throughout Section 5.0 is centered around the approximately 1,277-acre Land Control Area as identified in Figure 2.1-1 of this Joint Application. The 1,004-acre Preliminary Development Area is the portion of the Land Control Area that will be needed for construction and operation of the Solar Facility and BESS (refer to Figure 2.1-1). Additional description of the Land Control and Preliminary Development Areas is provided in Section 2.2. As explained in Section 2.1, Lake Charlotte is presenting a potential alternate layout for the solar arrays that may be utilized if county-maintained drain tile, present in the northeastern portion of the Preliminary Development Area, can be abandoned or re-aligned. Therefore, the total acres of the Preliminary Development Area evaluated throughout this Joint Application is overstated by approximately 58.0 acres.

The Applicant analyzed potential impacts on human and environmental resources for the Project using impact assessment areas. The impact assessment areas for each resource is the geographic area within which the Project may exert some influence. These impact assessment areas vary by resource and are summarized in Table 5.0-1.

The following impact assessment areas are used:

- **Preliminary Development Area**. The Preliminary Development Area includes the temporary construction workspaces and the footprints of permanent facilities that would be required for the preliminary design of the Project as described in Sections 2.1 and 4. This is used as the impact assessment area for displacement, geology and groundwater resources, soils, surface waters (including stormwater, floodplains, and wetlands), and vegetation.
- **One mile**. A distance of one mile from the Land Control Area is used as the impact assessment area for analyzing potential impacts to aesthetics, recreation, archaeological and historic resources, wildlife and their habitats, and rare and unique natural resources.
- **3,200 Feet from the Project Development Area**: A distance of 3,200 feet from the Preliminary Development Area is used as the impact assessment area for analyzing potential impacts related to noise. Only components within the Preliminary Development Area that will have associated operational noise are included in this analysis.
- **Study Area**. Defined generally as the townships and county where the Project is located, the Study Area is used as the impact assessment area for analyzing potential impacts to cultural values, environmental justice, public health and safety, public services and infrastructure, land use and zoning compatibility, socioeconomics, land-based economies, air quality, climate change and greenhouse gas emissions. These are resources for which impacts may extend throughout communities surrounding the Project.

**Table 5.0-1 Impact Assessment Areas**

| Impact Assessment Area | Specific Resource/Potential Impact to Resource |
|---|---|
| Preliminary Development Area | Displacement, Geology and Groundwater Resources, Soils, Surface Waters (Including Stormwater, Floodplains, and Wetlands), and Vegetation |

| Table 5.0-1 Impact Assessment Areas | |
|---|---|
| **Impact Assessment Area** | **Specific Resource/Potential Impact to Resource** |
| One Mile Buffer | Aesthetics, Recreation, Archaeological and Historic Resources, Wildlife and Their Habitats, and Rare and Unique Natural Resources |
| 3,200-foot Buffer | Noise |
| Study Area | Cultural Values, Environmental Justice, Public Health and Safety, Public Services and Infrastructure, Land Use and Zoning Compatibility, Socioeconomics, Land-Based Economies, Air Quality, Climate Change and Greenhouse Gas Emissions |

The preliminary design for the Solar Facility does not identify the locations of the posts for the solar arrays, so detailed calculations of impacts are not included for these features. Posts are typically 6-12 inches in diameter and would be installed via vibration or a pile driver in most locations; therefore, the permanent impacts associated with these features are expected to be negligible.

## 5.1 Environmental Setting

The MDNR and the U.S. Forest Service have developed an Ecological Classification System for ecological mapping and landscape classification in Minnesota that is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (MDNR, 2024a). Through the Ecological Classification System, the State of Minnesota is split into Ecological Provinces, Sections, and Subsections. The Project is located within the North Central Glaciated Plains Section of the Prairie Parkland Province (251B). The Project is in the Minnesota River Prairie ecological subsection (251Ba).

The Minnesota River Prairie ecological subsection is characterized by large till plains (loamy ground moraine) flanking the Minnesota River and consists of gently rolling ground moraine about 60 miles wide. The till plain is the dominant landform. The subsection is bounded to the southwest by the Prairie Coteau subsection and a series of end moraines define the eastern boundaries (from the northeast to southeast). Most of the subsection is covered by 100 to 400 feet of glacial drift. Cretaceous shales, sandstones, and clays are the most common kinds of bedrock. Well- to moderately well-drained loamy soils are dominant. Annual precipitation ranges from 25 inches in the west to 30 inches in the east, with 11 to 13 inches of growing-season precipitation. Prior to Euro-American settlement, vegetation was primarily tallgrass prairie, with many islands of wet prairie. Forests of silver maple, elm, cottonwood, and willow grew on floodplains along the Minnesota River and other streams. There were also dry gravel prairies on kames. Land in this subsection is currently used for agricultural activity. Upland prairie species to be common throughout most of the subsection (based on herbarium records). Remnant stands of tallgrass prairie are rare (MDNR, 2024b).

The Project is in Martin County in Rutland Township and is directly adjacent to the Town of Northrop. The southern boundary of Northrop is common to a portion of the northeastern perimeter of the Land Control Area. Additional municipalities near the Project are Fairmont (approximately 2.8 miles south), Granada (about 4.9 miles east), Trimont (about 14.4 miles west), and Madelia (about 21.3 miles north).

Rural residences are present along the margins of the Land Control Area and in some cases the Land Control Area has been designed to specifically exclude rural residential properties (refer to Map 2). Several rural residences were intentionally carved out of the Land Control Area to ensure that the residential yards would be avoided by Project design. Rural residences are situated along public roadways (160th Street, County Highway 38 [175th Street], 170th Street, County Highway 143 [210th Avenue], and State Highway 15 [220th Avenue]) as well as along Charlotte Oak Drive. Land use inside the boundary of the Land Control Area is focused on row crop production of predominantly corn and soybean.

Public roadways that generally bound the Land Control Area are MN Highway 15 to the east, 170th Street along part of the northern perimeter, and 210th Avenue (County Highway 143) along a portion of the eastern perimeter. Charlotte Oak Drive bounds a portion of the southwestern perimeter. Public roads 175th Street (County Highway 38), 170th Street, and 160th Street are parallel to each other and run in an east-west direction through the Land Control Area. County Highway 143 (210th Avenue) runs in a north-south direction bisecting the Land Control Area. A more detailed description of public roadways in the Study Area (i.e., the townships and county within which the Project occurs) is provided in Section 5.2.8.

The SMMPA Rutland Substation is generally centrally located within the Land Control Area and is located along 210th Avenue (County Highway 143). The SMMPA Rutland Substation is south of the proposed Project Substation and southwest of the BESS.

## 5.2 Human Settlement

Solar and BESS facilities have the potential to impact human settlements during construction and operation. Public health and safety issues during construction include injuries due to falls, equipment use, and electrocution. Health impact concerns related to the operation of the Project include health impacts from electric and magnetic fields, stray voltage, and electrocution. Solar facilities also have the potential to displace homes or businesses, introduce new noise sources, affect the aesthetics and socioeconomics of the Study Area, be incompatible with local land use planning and zoning, and impact public services such as transportation or the availability of first responders. Potential impacts on human settlement from construction and operation of the Project are discussed in more detail below.

### 5.2.1 Aesthetics

The topography of the Land Control Area varies from level in the eastern portion to gently rolling in the western portion. The topography of the Land Control Area is generally flat with elevations ranging from 1,134 to 1,169 feet above sea level. As discussed in Section 5.1, land use within the Land Control Area is predominantly agricultural (corn and soybean row crop production). Overall, the landscape within the one-mile buffer of the Land Control Area is a rural setting predominantly comprised of agricultural land use with scattered farmsteads situated along public and private roads. A lake-wetland corridor to the west and a forested riparian corridor to the northwest are also a part of the landscape within a mile of the Land Control Area. The lake and wetland complexes west of the Land Control Area and within the one-mile buffer are associated with County Ditch 72 and include Martin Lake, High Lake, Lake Charlotte, Keister Lake and Canright Lake. Elm Creek

and an associated forest riparian corridor is located to the northwest and outside of the Land Control Area but within the one-mile buffer.

One hundred and forty-nine (149) residences are within one mile of the Land Control Area (see Map 6). Table 5.2.1-1 shows how many of the 149 residences that are within one mile of the Land Control Area are within one mile of the Preliminary Development Area, the solar arrays, and the BESS facility.

**Table 5.2.1-1 Residences within One Mile of the Land Control Area**

| Distance [1] | Preliminary Development Area | Solar Arrays | BESS Facility |
|---|---|---|---|
| ≤ 50 feet | 0 | 0 | 0 |
| 51 feet to 150 feet | 2 | 0 | 0 |
| 151 feet to 300 feet | 13 | 8 | 0 |
| 301 feet to 500 feet | 6 | 7 | 0 |
| 501 feet to 1,000 feet | 22 | 22 | 1 |
| 1,001 feet to 5,280 feet (1.0 mile) | 105 | 110 | 84 |
| > 5,280 (1.0 mile) | 1 | 2 | 64 |
| **PROJECT TOTAL** | **149** | **149** | **149** |

[1] Measurements are based on the preliminary Project design.

The southern end of the Town of Northrop is directly adjacent to the Land Control Area on the north side of 170th Street. The southern portion of the Town of Northrop is comprised of residential land and recreational land. The Northrop Softball Field is located between 170th Street and Park Street within the Town of Northrop. Residences are also located south of Park Street and west of South Bridgeman Street. The Northrop Softball Field is within 250 feet of the Land Control Area. Residences along 170th Street are within 50 to 75 feet of the Land Control Area. The Project, including associated infrastructure such as stormwater ponds, will be visible to the residences and visitors to the softball field. The Northrop Softball Field is illustrated on Map 11.

Windrows or shelterbelts of trees surround or partially surround farmsteads and associated agricultural buildings that are adjacent to the Land Control Area boundary. Windrows or shelterbelts associated with residences along Charlotte Oak Drive are also present. Martin Lake and Lake Charlotte with a wetland complex (High Lake) between the two lake systems that occur along the western portion of the Land Control Area. Slightly larger forested areas exist primarily along the margins of the lakes and the associated wetland complex.

Lake Charlotte developed the Land Control Area and Preliminary Development Areas to avoid rural residences. As such, there are no residences or businesses within the Land Control Area or the Preliminary Development Area. However, several rural residences are surrounded by the Land Control Area boundary. These rural residences were intentionally carved out of the Land Control Area to ensure that the residential yards would be avoided by Project design.

The existing SMMPA Rutland Substation (i.e., the POI for the Project) is adjacent to the Land Control Area in Section 17, about 1.4-miles southwest of Northrop. There are six transmission

lines at least partially within the Land Control Area, three running generally from east to west and three running generally from north to south, five of which interconnect to the SMMPA Rutland Substation from the north, south, east, and west (Energy Information Administration, 2023). Approximate locations of these transmission lines are displayed on Map 7. Three of the electric lines operate at 69 kV, two operate at 161 kV, and one does not have its voltage publicly available. All six of the lines do not have their operators listed in publicly available data.

#### 5.2.1.1 Impacts and Mitigation Measures

The Project will convert approximately 1,004 acres of predominately agricultural land (refer to Table 5.2.9-2 and associated discussion) to a solar facility and BESS characterized by complex geometric forms, lines, and surfaces that may be divergent from the surrounding rural landscape. Most of the 1,004-acre Preliminary Development Area will be filled with rows of low-profile solar PV panels and perennial vegetation. Solar energy generation facilities consist of glass panels that are designed to maximize absorption and minimize reflection to increase electricity production efficiency. The figures in Section 4.1 provide a reference for how the Lake Charlotte Project will appear during operation. To limit reflection, solar photovoltaic panels are constructed of dark, light--absorbing materials and covered with an anti-reflective coating. Today's panels reflect as little as two percent of the incoming sunlight depending on the angle of the sun and assuming use of anti-reflective coatings.

In addition to the solar arrays, the aboveground Project components within the Preliminary Development Area will be most visible to residences and passersby on public roads include the BESS facility, Project Substation, inverters, O&M building, fenceline, and gen-tie line structures. Access roads throughout the Preliminary Development Area will also be visible, as well as electrical collection lines if the hybrid option is used (refer to Section 4.1.1.2). Most of these facilities will also be low-profile (i.e., less than 20 feet in height) and the underhung electrical collection lines are not likely to be readily discernable to outside observers.

The Project Substation and the BESS facility will be of similar vertical profile as the existing SMMPA Rutland Substation that is adjacent to the Land Control Area in Section 17. If the hybrid electrical configuration is selected, cabling will be strung under each row of panels on steel arms and a steel cable attached to the piles. At the end of each row, hanging brackets would connect several racks/rows of cables to a common collection point near their assigned inverter/transformer skid where the cables will be routed below-ground. The above-ground cabling would not likely be visible outside the facility due to a combination of them being attached to the underside of the panels and in-between rows as well as the line of sight with other components (arrays, inverters), distance from observer, and existing vegetative screening around residences.

Structures for the gen-tie line would be less than 150 feet in height and will be limited to the area between the proposed Project Substation and the SMMPA Rutland Substation, which are approximately 50 feet apart. As noted in the description of the existing aesthetic environment, several transmission lines are already present in this area (refer to Map 7). The gen-tie structures will be visible from the local roadways but will be similar to the existing visual environment.

The solar arrays and BESS will be visible from public roads that surround and bisect the Land Control Area and from residential areas in Northrop and the farmsteads that are directly adjacent

to the Land Control Area. However, given the relatively low profile of the solar arrays and BESS, they will not be visible from long distances. Additionally, Lake Charlotte has designed the Project to avoid tree clearing and, as such, existing trees, windrows, and shelterbelts around residences will be maintained and provide some natural vegetative screening. Vegetative plantings will be prescribed along and in the vicinity of 170th Street to visually screen the residential areas within the Town of Northrop from the solar arrays.

Operation of the Project will require downlit security lighting at the entrance of the Project and there will be downlit, switch controlled lights at each inverter for repair purposes. Impacts on light -sensitive land uses are not anticipated given the rural Project location coupled with minimal required lighting for operations.

### 5.2.2 Cultural Values

Cultural values include those perceived community attitudes or beliefs that provide a framework for community unity. Solar and BESS projects have the potential to affect public participation in community and regional events during both construction and operation.

Prior to European settlement, Native American groups lived in the Project Study Area for thousands of years. The original population living in the Project Study Area were the Winnebago, whose historic territory includes southwestern Minnesota as well as parts of Wisconsin, Illinois, Nebraska, and Iowa. The Winnebago, also known as the Ho-Chunk, are a branch of Sioux Nation (Winnebago Tribe of Nebraska, n.d.). Other branches of Sioux that resided nearby include the Upper Sioux Community Pezihutazizi Oyate (Dakota Nation) and the Lower Sioux Indian Community, and the Mdewakanton Band of Dakota.

As Euro-American settlers began moving into the region, Winnebago peoples were often displaced and lost access to their homeland and traditional subsistence resources. By the mid- to late- 1800s, Euro-American settlers began to dominate southwestern Minnesota, building homesteads and establishing agricultural fields across most of the landscape. The 1862 U.S./Dakota Conflict resulted in many Dakota, and other branches of Sioux like the Winnebago, to be forcibly removed to reservations in other states. Today, the Winnebago reservation is located in northeast Nebraska about 200 miles southwest of the Project.

At present, the Project Study Area is a predominantly rural area within Martin County, Minnesota. According to the U.S. Census Bureau (2023a), the majority of the population in Martin County, roughly 89 percent, identifies as White only, not Hispanic or Latino with an ethnic background of European origin. Only about 0.8 percent of the current population in Martin County identifies as American Indian and Alaska Native alone.

In addition to ethnic heritage, economic industry also influences the culture of the Study Area. As a predominantly rural county, agricultural production, including drop cultivation and animal husbandry, are prevalent in Martin County. According to the U.S. Department of Agriculture (USDA) Census of Agriculture, approximately 99.5 percent of the land in Martin County is used for agricultural purposes (USDA, 2022). Additional information about the agricultural industry in Martin County is presented in Section 5.3.1.

Cultural representation in community events appears to be more closely tied to geographic features, seasonal events, national holidays, and municipal events than to those based in ethnic heritage. Examples of regional cultural buildings include the Fairmont-Red Rock Center for the Arts in Fairmont, Minnesota which hosts live music and weekly art walk throughs, the Northrop-Martin Luther High School in Northrop, Minnesota which hosts a surplus of events throughout the year, and the Chubb House, a historic house in Fairmont, Minnesota from 1867 that hosts weekly coffee chats and other events. Examples of winter events in the area include the Southern Minnesota Pond Hockey Tournament, the Fairmont Lakes Foundation Ice Fishing Tournament, and free weekly yoga classes hosted by the Fairmont United Methodist Church. Summertime events include the Martin County Fair, Interlaken Heritage Days, and the Fairmont Triathlon. (Martin County Fair MN, 2025; Interlaken Heritage Days, 2024; and Fairmont Triathlon, 2025).

#### 5.2.2.1 Impacts and Mitigation Measures

The Project would not impact public participation in the regional community cultural events noted above because it is located outside of municipal areas where these events take place. Therefore, no impacts on cultural values are anticipated and no mitigation measures are proposed.

### 5.2.3 Displacement

The Land Control Area boundary was developed to specifically exclude residences, businesses, and other structures such as barns or sheds as shown in Map 6. However, as shown in Table 5.2.1-1, there are several residences adjacent to the Land Control Area, mostly concentrated within the Town of Northrop. The nearest residence to the Land Control Area is in the Town of Northrop and is approximately 94 feet north of the Preliminary Development Area, on the opposite side of 170$^{th}$ Street.

#### 5.2.3.1 Impacts and Mitigation

Lake Charlotte designed the Land Control Area to avoid residences, businesses, and other structures. As such, there is no potential for the proposed Project to displace residences. Because there are no occupied residences within the Land Control Area, there will not be any displacement; and no mitigation is proposed.

### 5.2.4 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income in decisions related to the development, implementation, and enforcement of environmental laws, regulations, and policies (MPCA, 2025a). The MPCA developed the Understanding Environmental Justice in Minnesota online screening tool to assist with identifying areas of concern for environmental justice (MPCA, 2025b). The online tool uses demographic and economic data from the U.S. Census Bureau at the census tract level to identify environmental justice communities.

In addition, Minnesota House Bill 7 updated Minn. Statutes § 216B.1691, Subd. 1(e) to define an environmental justice area in Minnesota:

"(e) "Environmental justice area" means an area in Minnesota that, based on the most recent data published by the United States Census Bureau, meets one or more of the following criteria:

(1) 40 percent or more of the area's total population is nonwhite;

(2) 35 percent or more of households in the area have an income that is at or below 200 percent of the federal poverty level;

(3) 40 percent or more of residents over the age of five have limited English proficiency; or

(4) the area is located within Indian country, as defined in United State Code, title 18, section 1151."

The Land Control Area is within Census Tract #2709179020. Review of the MPCA's online tool indicates that there are no areas of environmental justice concern in Census Tract #2709179020 (MPCA, 2025b). Information relevant to the Minnesota definition of an environmental justice area is provided in Table 5.2.4-1.

**Table 5.2.4-1 Environmental Justice Review of the Project Study Area [1]**

| County/Census Tract | Minn. Statutes § 216B.1691, Subd. 1(e) Criteria | | | |
|---|---|---|---|---|
| | Percent Non-white Population | Percent of Households with Income Equal to or Below 200 Percent of Poverty Level | Percent of Residents with Limited English Proficiency | Within Indian Country? |
| **Martin County** | | | | |
| Census Tract 2709179020 | 5.8% | 29.1% | 0.7% | No |
| Source: MPCA, 2025b | | | | |

As shown in Table 5.2.4-1, the presence of an environmental justice area is not indicated by the percentage of the non-white minority groups, income considerations, or the percentage of persons with limited English proficiency in Census Tract #2709179020. In addition, no federally recognized Indian Tribes or reservation lands are present in Martin County or census Tract #2709179020.

### 5.2.4.1 Impacts and Mitigation Measures

No environmental justice areas are present within the Land Control Area based on review of the MPCA's Understanding Environmental Justice in Minnesota online screening tool. As the Project would not impact environmental justice communities, no mitigation measures specific to these communities are proposed.

### 5.2.5 Public Health and Safety

The Project is in rural Martin County which according to the U.S. Census Bureau's Quick Facts website, has a population density of 28.1 persons per square mile of land area (U.S. Census Bureau, 2024). If emergency personnel were needed at the Project, multiple agencies would likely respond, depending on the situation. These would include the Fairmont Fire Department, Martin County Sheriff's Office, and Mayo Clinic Health System and Ambulance Service in Fairmont, all of which are approximately 4 to 5 miles south of the Project. Martin County has an emergency management division within the Martin County Sheriff's office that assists the population in preparing for and responding to disasters and emergencies (Martin County, 2025a).

There is one tower that is a part of the Allied Radio Matrix for Emergency Response (ARMER) in Martin County. This ARMER tower is a part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders. The ARMER radio system operates by line of sight, talking to other ARMER towers. 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. There are no ARMER towers within one mile of the Lake Charlotte Project; the nearest ARMER tower is located in the town of Welcome, which is approximately 8.5 miles southwest of the Land Control Area. (RadioReference, 2024).

Tetra Tech, Inc. (Tetra Tech) conducted a Phase I Environmental Site Assessment (Phase I ESA) on October 7, 2024, that encompassed the Land Control Area and is comprised of approximately 1,5,24 acres referred to as the subject property. The Phase I ESA did not reveal any Historical Recognized Environmental Conditions, Controlled Recognized Environmental Conditions, or Business Environmental Risks. However, the Phase I ESA did reveal two Recognized Environmental Conditions (RECs) with the subject property (Tetra Tech, 2025): the Rutland Township Garage and Poppe Oil Bulk Plant and Poppe Oil Co.

The Rutland Township Garage is located at South Bridgeman Street and West Freund Street and is mapped approximately 1,500 feet northeast of the subject property and Land Control Area. The site was listed in the Leaking Underground Storage Tank, Site Remediation Section, Vapor Intrusion and What's In My Neighborhood databases. The release of fuel oil #1 and #2 occurred from a steel underground storage tank reported in July 2021 during the removal of the underground storage tank. Groundwater contamination was reported. A Petroleum Tank Release Site File Closure letter dated January 6, 2023, from the MPCA states that the owner has adequately addressed the petroleum tank release at the site. However, due to the presence of non-petroleum contamination, this site has been referred to the MPCA's Site Assessment Program for potential state and/or federal Superfund oversight. The letter also states that if future development of the property or the surrounding area is planned, it should be assumed that petroleum contamination may still be present.

Based on reported groundwater contamination, active site assessment status, distance to the subject property, and inferred groundwater flow direction toward the subject property, these listings are considered to represent a REC for the subject property.

Poppe Oil Bulk Plant and Poppe Oil Co are listed at 111 South Bridgeman Street and mapped approximately 1,500 feet northeast of the subject property and Land Control Area. The site is listed in the Underground Storage Tank, Aboveground Storage Tank, Financial Assurance, Leaking Underground Storage Tank, Sight Remediation Section, and Vapor Intrusion databases and twice in the What's In My Neighborhood database.

According to the MPCA Tank and Leak Site Search, eleven tanks are (or were) located at this site. One underground storage tank and four aboveground storage tanks were reported to have been removed from the site. Six active aboveground storage tanks installed in December 2003 were reported to be located at the site.

The site is listed in the Leaking Underground Storage Tank database as a leak site and further research on the MPCA Tank and Leak Site Search indicated a release of diesel, fuel oil #1 and #2, and gasoline from a steel aboveground storage tank. Groundwater contamination was reported; however, no additional information was reported on the extent. Soil borings were collected in October 2008, and tank removal occurred in August 2011. A total of 90 cubic yards of soil were taken to a landfill in September 2011. A Petroleum Tank Release Site File Closure letter dated February 8, 2012, issued by the MPCA, indicated that owner has adequately addressed the petroleum tank release at the site. The letter also states that if future development of the property or the surrounding area is planned, it should be assumed that petroleum contamination may still be present.

Based on reported groundwater contamination, distance to the subject property, and inferred groundwater flow direction toward the subject property, the Leaking Underground Storage Tank, Sight Remediation Section, and Vapor Intrusion listings are considered to represent a REC for the subject property. Based on the collective volume of the six active aboveground storage tanks and distance to the subject property, the material threat of release from the active aboveground storage tanks at the site is considered to represent a REC.

#### 5.2.5.1 Impacts and Mitigation

Potential public health and safety issues during construction of solar generation and storage projects include injuries due to falls, equipment use, and electrocution. Construction activities will comply with local, state, and federal safety codes and regulations regarding installation of the Project facilities and standard construction practices. Established industry safety procedures will be followed during and after construction of the Project; these include clear signage during all construction activities and fencing of all Project facilities to prevent public access. Hazard mitigation measures will be utilized to avoid BESS fire safety risks including storing lithium-ion batteries in weather-proof enclosures that include fully integrated heating, ventilation, and air conditioning system for temperature control, sensors and controls for remote monitoring, and built-in fire detection and suppression.

The Project will have minimal impact on the security and safety of the local populace in Martin County. Lake Charlotte is gathering information to coordinate with all emergency and non-emergency response teams for the Project, including law enforcement agencies, local fire departments, ambulance services, and 911 services. The type and number of responding agencies will depend on the incident requiring emergency services. Lake Charlotte will develop an

Operations and Emergency Action Plan that outlines local contacts (first responders and internal operation and maintenance staff) and emergency procedures for evacuation, fire response, extreme weather, injury, and criminal behavior. This plan will include annual education, training or drills to be coordinated with local first responders.

While there is an ARMER tower approximately 8.5 miles away from the Land Control Area, the Project will not impact this communication system as Project facilities are proposed below the typical height of a tower and line-of-sight near the top of these towers (i.e., greater than 150 feet above ground). Lake Charlotte anticipates the structures for the gen-tie line to be less than 150 feet tall. As such, no mitigation is proposed.

The Phase I ESA identified two RECs. The identified RECs were approximately 1,500 feet northeast of the subject property which includes the Land Control Area. Groundwater sampling is recommended for potential contaminants of concern along the subject property boundary closest to the Rutland Township Garage and Poppe Oil Bulk Plant sites. If, after additional investigation, it is determined the Project may encounter contaminated groundwater a Contaminated Sites Management Plan will be developed.

### 5.2.6 Electric and Magnetic Fields

Electric and magnetic fields are present around any electrical device. Electric fields arise from the voltage or electrical charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, power collection lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors. Electric and magnetic fields can occur indoors and outdoors.

Project facilities that would generate electric and magnetic fields include the electrical collection lines and transformers installed at each inverter associated with the Solar Facility, BESS, and the gen-tie line. Electric and magnetic fields from electrical collection lines, regardless of whether they are below-ground or above-ground, transmission lines, and transformers dissipate rapidly with distance from the source (National Institute of Environmental Health Sciences [NIEHS], 2002). Generally speaking, higher voltage electrical lines produce higher levels of electric and magnetic fields at the source before dissipating with distance.

Approximately 25,000 scientific papers have been published in the past 30 years regarding the health effects of exposure to electric and magnetic fields. The World Health Organization performed a review of the current scientific literature and concluded that there is no evidence of low-level electric and magnetic fields causing negative health effects (World Health Organization, 2016). Guidelines are set to ensure members of the public are not exposed to potentially harmful levels of electric and magnetic fields. The internationally accepted guideline for the general public exposed to electric fields is 4.2 kV per meter (kV/m) and 833 milliGauss for magnetic fields (NIEHS, 2002).

#### 5.2.6.1 Impacts and Mitigation

Levels of electric and magnetic fields from the Project as proposed in this Joint Application will be considerably below acceptable guidelines for public exposure. Project-specific electric and

magnetic field levels were not modeled for the 34.5 kV electrical collection lines, 161 kV overhead gen-tie line, or inverters and transformers. However, several studies have documented electric and magnetic field exposure of various high voltage transmission lines. The NIEHS provides typical electric and magnetic field levels for power transmission lines (NIEHS, 2002). For 230 kV transmission lines, which is higher voltage than the Project gen-tie line, electric fields directly below the transmission line were reported at 2.0 kV/m before dissipating to 1.5 kV/m at 50 feet (the approximate edge of right-of-way). Similarly, average magnetic fields directly below the 230 kV transmission line were reported at 57.5 milliGauss before dissipating to 19.5 milliGauss at 50 feet (NIEHS, 2002). For 500 kV transmission lines, which is much higher than the voltage of the Project gen-tie line, electric fields directly below the transmission line were reported at 7.0 kV/m before dissipating to 3.0 kV/m at 65 feet (approximate edge of right-of-way). Similarly, average magnetic fields directly below the 500 kV transmission line were reported at 86.7 milliGauss before dissipating to 29.4 milliGauss at 65 feet (NIEHS, 2002).

A Canadian study of collection lines at a wind facility measured electric and magnetic fields of the project's 27.5 kV collection lines, which is slightly lower voltage than the electrical collection lines proposed for the Project. This study found magnetic fields associated with buried electrical collection lines to be within background levels at one meter above ground and up to 16.5 milliGauss directly beneath overhead 27.5 kV lines (McCallum et al., 2014). As demonstrated here, both electric and magnetic fields will be well below the international guidelines of 4.2 kV/m and 833 milliGauss, respectively. Additionally, since the transformers are enclosed in a grounded metal case (i.e., shielded), they typically do not emit much electric and magnetic fields.

Stray voltage from electrical facilities is often a concern in agricultural areas, particularly on dairy farms. Stray voltage is an unintended transfer of electricity between two grounded objects and is typically caused by improperly grounded electrical equipment in farm buildings or by a faulty utility connection. All electrical components in the Project, including inverters and transformers, will be grounded in accordance with NESC. Soil resistivity measurements will be taken on site as part of the Project's geotechnical analysis, and that data will be used to help design grounding systems. For these reasons, the potential for stray voltage as a result of the Project will be negligible. Should a fault occur during operation of the Project, it would be quickly identified by Project monitoring systems and corrected.

The nearest residence to the solar arrays is 197 feet away; the nearest residence to an inverter, electrical collection line, and transformer is approximately 352 feet away; and the nearest residence to the BESS is approximately 815 feet away (refer to Map 6). At this distance, both electric and magnetic fields would have dissipated to background levels before reaching the residence. As such, impacts will be negligible and no mitigation measures are proposed.

### 5.2.7 Noise

Noise measurement utilizes decibels on a logarithmic scale. Human hearing responds differently to various frequencies, so the A-weighted decibel scale (dBA) assigns different weights to frequencies to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that the average human ear does not hear as well, such as very high and very low frequencies.

The Project sits in an agricultural and residential area. Common sound sources within an agricultural and rural residential environment include, but are not limited to, sound from farm equipment such as tractors and combines, sounds from birds and insects, sound generated from traffic on roadways, and wind rustling through vegetation. According to American National Standards Institute / Acoustical Society of America S12.9-2013/Part 3, rural residential areas have a typical daytime noise level of 40 dBA and a typical nighttime noise level of 34 dBA.

Background noise in the area surrounding the Project is typically a result of farming equipment/operations, wind, and vehicles. Table 5.2.7-1 outlines typical noise-generating sources.

**Table 5.2.7-1 Common Noise Sources**

| Sound Pressure Level (dBA) | Common Noise Source |
|---|---|
| 110 | Rock band at 5 meters |
| 100 | Jet flyover at 300 meters |
| 90 | Gas lawn mower at 1 meter |
| 85 | Food blender at 1 meter |
| 75 | Shouting at 1 meter |
| 70 | Vacuum cleaner at 3 meters |
| 60 | Normal speech at 1 meter |
| 55 | Large business office |
| 50 | Dishwasher in next room, quiet urban daytime |
| 40 | Library, quiet urban nighttime |
| 30 | Bedroom at night |
| 20 | Quite rural nighttime |
| 0 | Threshold of hearing |

Source: MPCA, 2015

The MPCA has the authority to adopt noise standards pursuant to Minnesota Statute Section 116.07, subd. 2. Minnesota Rule Chapter 7030 sets forth the adopted standards as A-weighted noise levels. Different standards exist for daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours. The noise standards specify the maximum allowable noise volumes that may not be exceeded for more than 10 percent of any hour ($L_{10}$) and 50 percent of any hour ($L_{50}$). Household units, including farmhouses and rural residential areas, are included in Noise Area Classification 1. Table 5.2.7-2 shows the MPCA state noise standards.

**Table 5.2.7-2 MPCA State Noise Standards - Hourly A-Weighted Decibels**

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

Source: Minn. R. § 7030.0040

Noise sensitive areas (NSAs) near the Land Control Area consist of residential homes, a school, and a church. These NSAs are all located in the city of Northrop and so are held to the Noise Area Classification 1 limits shown in Table 5.2.7-2. The MPCA provides guidance on noise propagation and attenuation in the manual "A Guide to Noise Control in Minnesota" (MPCA, 2015). This guidance states that over distance, sound attenuates, or is reduced in amplitude, and is perceived as becoming quieter. This occurs as the sound travels outward to an increasingly larger sphere or cylinder, and the energy per unit of area decreases. Similarly, when the sound energy doubles, such as having two sources of 50 dBA instead of one source of 50 dBA, the sound level increases by approximately 3 dBA. The human ear can usually tell the difference when sound changes by 3 dBA, and a 5 dBA change is clearly noticeable.

Lake Charlotte identified NSAs within 3,200 feet of the Land Control Area and summarized the proximity of these NSAs to the Land Control Area in Table 5.2.7-3.

**Table 5.2.7-3 Proximity of NSAs within 3,200 feet of the Land Control Area**

| Radial Distance from Site to Receptors (feet) | Number of Receptors |
|---|---|
| <100 | 0 |
| 100 - 200 | 2 |
| 200 - 400 | 11 |
| 400 - 800 | 16 |
| 800 - 1,600 | 41 |
| 1,600 - 3,200 | 75 |

### 5.2.7.1 Impacts and Mitigation Measures

During construction, construction vehicles and equipment will emit noise. The amount of noise will vary based on what type of construction occurs on a given day. Nearby NSAs will likely perceive construction-associated noise (refer to Map 8 - Noise Receptors). Grading equipment, skidsteers, and other construction equipment emit noise between 76 and 85 dBA at 50 feet (U.S. Department of Transportation [USDOT], [2017). Noise associated with these types of equipment will primarily occur during the initial site preparation, which will include grading and access road construction and should last approximately six weeks. Lake Charlotte anticipates pile driving of the rack supports to create the most noise measured at 101 dBA at 50 feet (USDOT, 2017). Table 5.2.7-4 shows the typical sound pressure levels in dBA at 50 feet for various construction equipment (USDOT, 2017).

**Table 5.2.7-4 Typical Sound Levels from Construction Equipment**

| Equipment | Max Sound Pressure Level 50 feet (dBA) |
|---|---|
| Backhoe | 80 |
| Compactor | 82 |
| Concrete Mixer | 85 |
| Dozer | 85 |
| Generator | 81 |
| Grader | 85 |

| Table 5.2.7-4 Typical Sound Levels from Construction Equipment | |
|---|---|
| **Equipment** | **Max Sound Pressure Level 50 feet (dBA)** |
| Loader | 85 |
| Pile Driver (Impact) | 101 |
| Truck | 88 |
| Source: USDOT, 2017 | |

Each rack support takes between 30 seconds and 2 minutes to install, depending on soil conditions; Lake Charlotte anticipates this activity will take up to 16 weeks across the site. The pile driving activity will not be concentrated in one area of the site but will instead be limited to the time it takes to install pile in each area. Once pile driving is completed in an area, the pile driving will move systematically across the site until complete. Installing the solar panels on the tracking system would emit noise levels similar to the general construction equipment described above in Table 5.2.7-4. Typically, a forklift places individual panels on the tracking rack system. The noise from any of these construction activities would dissipate with distance and remain audible at varying decibels, depending on the locations of the equipment and receptor. Note that workers will sequence construction activities; site preparation may occur at one portion of the site while pile driving occurs at a different location.

The main source of noise from the Project during operation will come from the inverters and BESS units, which include air conditioners housed in each inverter, and, to a lesser extent, from the transformers and rotation of the tracking system. For the BESS units, the cooling fans will generate the main source of noise. Table 5.2.7-5 summarizes the anticipated distance to reach the most stringent MPCA noise standard (50 dBA) from a range of inverters and trackers under consideration for the Lake Charlotte Project. Table 5.2.7-5 also provides the dBA at 50 feet so noise levels can be calculated at greater distances, based on specifications provided by technology manufacturers.

| Table 5.2.7-5 Operational Unit Noise Levels | | | |
|---|---|---|---|
| **Type** | **Equipment Model** | **Distance to 50 dBA** | **dBA at 50 feet** |
| Inverter | TMEIC Solar Ware Ninja PVU-L0920GR | 58 feet | 51 |
| Tracker | ATI DuraTrack HZ v3 | 52 feet | 51 |
| BESS | TESLA Megapack 2 XL | 292 feet | 65 |
| [1] Noise estimates from the manufacturer are preliminary and conservative; therefore, the estimated distance to a dBA of 50 and dBA at 50 feet represent the worst-case scenario. | | | |

Noise levels will be less than 50 dBA at a distance of 58 feet from the inverter, 52 feet from the trackers, and 292 feet from the BESS units. The Project has been designed to meet the nighttime $L_{50}$ dBA noise standard, as the closest receptor to the facility is 215 feet away from the edge of a solar array. The distance of the nearest BESS unit to a residence is 815 feet, and modeling of all planned BESS units indicates that the anticipated noise level of the BESS site operating at 100% capacity will remain below 50 dBA, confirming compliance with Minnesota's state noise standard. Table 5.2.7-6 summarizes the anticipated noise level at the nearest residence to the BESS.

| Table 5.2.7-6 Noise Level At Nearest Residence Due To BESS Operation | | |
|---|---|---|
| **Building Type** | **Distance to BESS (ft)** | **Noise Due to BESS[1]** |
| Residence | 815 | 49.4 dBA |
| [1] BESS noise estimates assume 192 TESLA Megapack units operating at 100% capacity. Manufacturer estimates are preliminary and conservative. The TESLA Megapack is the loudest of all units being considered; therefore, the estimated operational noise represents the worst-case scenario. | | |

The distance of the nearest Solar Facility inverter to a residence is 352 feet (refer to Map 8). Inverters typically sit within the middle of the solar arrays, so nearby homes are unlikely to hear noise from the project equipment over the background noise.

During construction, Lake Charlotte will limit construction to daylight hours. No noise impacts are anticipated during operation; therefore, no mitigation measures are proposed.

## 5.2.8 Public Services and Infrastructure

### 5.2.8.1 Public Services

Public services are those typically provided by a government entity to its citizens and those services are used to benefit public health and safety. These services can include emergency services, potable water, sanitary systems, and utilities. Water in Martin County is supplied by surface water and ground water and is serviced by Red Rock Rural Water System and Fairmont Public Utilities (Martin County, 2016; Red Rock Rural Water System, 2025; City of Fairmont Minnesota, 2025a). Sewage is serviced by subsurface sewage treatment systems, otherwise known as septic systems (Martin County, Minnesota, 2022). Approximately four telephone service providers and 15 broadband providers operate in Nobles County. (Minnesota DOC, 2024; Minnesota Department of Employment and Economic Development, 2023).

### 5.2.8.2 Transportation

The nearest state and interstate highways in the area are Minnesota State Highway 15 which forms the eastern boundary of the Land Control Area and Interstate 90 approximately 2 miles south of the Land Control Area. Roads that border or intersect the Land Control Areas include: 160$^{th}$ Street, 170$^{th}$ Street, 175$^{th}$ Street, 210$^{th}$ Avenue, 220$^{th}$ Avenue/ Minnesota State Highway 15, and Charlotte Oak Drive. Roads within a mile of the Land Control Area include: 230th Avenue, Park Street, South Judson Street, North Judson Street, South James Street, North James Street, South Bridgeman Street, Inness Street, Freund Street, Von Holst Street, Harper Street, State Street (County State Aid Highway 38), Martin Luther Drive, 190th Street, Ranch Road, 196th Avenue, 150th Street, and 208th Avenue.

Annual Average Daily Traffic (AADT) counts from Minnesota Department of Transportation's (MNDOT) Traffic Mapping Application are provided for roads that surround or bisect the Land Control Area in Table 5.2.8-1 and displayed on Map 7 – Existing Infrastructure and AADT (MNDOT, 2025a). AADT is not available for some county and township roads and, as such, these roads are not included in the table.

| Table 5.2.8-1 Annual Average Daily Traffic in the Project Vicinity | | |
|---|---|---|
| **Roadway** | **Year** | **AADT Traffic Volume Total** |
| Minnesota State Highway 15/220th Avenue (South of South Junction County State Aid Highway 38) | 2022 | 5,141 |
| Minnesota State Highway 15/220th Avenue (North of County State Aid Highway 44) | 2022 | 3,495 |
| County State Aid Highway 145/Bridgeman Street | 2023 | 228 |
| County Road 143/210th Avenue | 2022 | 57 |
| Interstate 90 (West of Minnesota State Highway15) | 2022 | 6,417 |
| Interstate 90 (West of County State Aid Highway53) | 2023 | 7,755 |
| County State Aid Highway 38/170th Street | 2022 | 791 |
| County State Aid Highway 38/175th Street (West of County Road 145) | 2022 | 528 |
| County State Aid Highway 38/175th Street (East James Street) | 2022 | 550 |
| County State Aid Highway 39/North Bixby Road (North of Interstate 90) | 2022 | 2,149 |
| County State Aid Highway 39/190th Avenue (South of County State Aid Highway 44) | 2022 | 1,153 |
| County Road 142/190th Street | 2023 | 183 |
| County State Aid Highway 143/150th Street | 2022 | 115 |
| County State Aid Highway 143/208th Avenue | 2023 | 98 |
| Source: MNDOT, 2025a | | |

There will be a total of seven access points to the Project from public roadways, six to the Solar Facility and one access point to the Project Substation and BESS.

There are no railroads within one mile of the Land Control Area. There is a Dakota, Minnesota & Eastern Railroad 2.8 miles southeast of the Land Control Area that runs generally east-west and a Union Pacific Railroad approximately 3.5 miles south of the Land Control Area that runs generally east-west (MNDOT, 2025b).

The nearest Federal Aviation Administration (FAA)-registered airport to the Lake Charlotte Project is the Fairmont Municipal Airport located approximately 4.2 miles southeast of the Land Control Area. This airport operates two asphalt runways and is used primarily for transient and local general aviation (AirNav, 2025). Aerial imagery was reviewed to identify any private landing strips within a mile of the Land Control Area; none were identified.

#### 5.2.8.3 Emergency Services

If emergency personnel were needed for the Lake Charlotte Project, multiple agencies would likely respond, depending on the situation, these agencies include the Fairmont Fire Department, Martin County Sheriff's Office, and Mayo Clinic Health System and Ambulance Service in Fairmont.

#### 5.2.8.4 Local Utilities

Rural water is supplied by surface water and groundwater in Martin County and is serviced by Red Rock Rural Water System and Fairmont Public Utilities (Martin County, 2016; Red Rock Rural Water System, 2025; City of Fairmont Minnesota, 2025a). No active wells or septic fields are present within the Land Control Area based on a review of Minnesota Department of Health (MDH) records (MDH, 2025). Electric Service in the study area is provided by Federated Rural Electric Association (MPUC, 2025)

#### 5.2.8.5 Regional Utilities

The Project is located adjacent to the SMMPA Rutland Substation, which is the POI for the Project. There are six transmission lines at least partially within the Land Control Area, three running generally from east to west and three running generally from north to south, five of which interconnect to the SMMPA Rutland Substation from the north, south, east, and west (Energy Information Administration, 2023). Approximate locations of these transmission lines are displayed on Map 7. Three of the electric lines operate at 69 kV, two operate at 161 kV, and one does not have its voltage publicly available. All six of the lines do not have their operators listed in publicly available data.

The National Pipeline Mapping System was searched to assess whether pipelines are present within or adjacent to the Land Control Area. National Pipeline Mapping System data consists of gas transmission pipelines and hazardous liquid pipelines jurisdictional to the Pipeline and Hazardous Materials Safety Administration. There are no pipelines in the Land Control Area. The nearest natural gas transmission pipelines are mapped approximately 2 miles northwest of the Land Control Area, running generally southwest to northeast, and 2.4 miles southwest of the Land Control Area running generally northwest to southeast (National Pipeline Mapping System, 2025).

#### 5.2.8.6 Public Communications

Landline telephone service in the Study Area is provided to farmsteads, rural residences and businesses by Frontier Communications of Minnesota (Minnesota DOC, 2024). Cellular services in the Study Area are provided by carriers including AT&T, T-Mobile and Verizon. Cable service is provided by Midcontinent Communications. Other services that are operating in Martin County including fixed wireless, satellite, Digital Subscriber Line, and fiber, include BEVCOMM, Consolidated Communications Fidium, Federated Broadband, Frontier, HughesNet, LTD Broadband, Midcontinent Communications, MVTV Wireless, Mediacom, Dunnell Telephone Company, Starlink, Viasat, Inc., Nextlink, and Independent Networks (Minnesota Department of Employment and Economic Development, 2023).

#### 5.2.8.7 Emergency Communications

There is one tower that is a part of the ARMER in Martin County. This ARMER tower is a part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders. The ARMER radio system operates by line of sight, talking to other ARMER towers. 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. There are no ARMER towers within one mile of the Lake Charlotte Project; the nearest ARMER tower is located in the town of Welcome, which is approximately 8.5 miles southwest of the Land Control Area. (RadioReference, 2024).

#### 5.2.8.8 Impacts and Mitigation Measures

**Public Services and Local Utilities**

Lake Charlotte will coordinate with Gopher State One Call before and during construction to fully understand infrastructure locations and safety concerns and to avoid possible structural conflicts. Lake Charlotte will also conduct an American Land Title Association survey to identify the locations of underground utilities. Final design of the Project will minimize and avoid impacts to underground utilities; if conflicts are unavoidable, Lake Charlotte will coordinate with the utility to develop an approach to reroute or otherwise protect the utility. Underground utilities will be marked prior to construction start.

**Transportation**

Access to the Preliminary Development Area will be via existing state, county, and township roads. With the limited possible exception of minor field access or driveway changes depending on final design, no changes to existing roadways will occur. The roads used for access to the Preliminary Development Area are shown on Map 2. During the construction phase, temporary traffic impacts are anticipated on some public roads near the Preliminary Development Area, primarily from construction personnel traveling to and from the Project and slow-moving construction vehicles.

Construction traffic will use the existing county roadway system to access the Preliminary Development Area and deliver construction materials and personnel. Traffic during construction is estimated to average approximately 150-160 pickup trucks, cars, and/or other types of employee vehicles onsite for the majority of construction. It is estimated that approximately 18-48 semi-trucks per day will be used for delivery of facility components. Semi-truck delivery will vary per day depending on stage of construction and delivery timeline of equipment. Overweight or oversized loads are unlikely. If they are required, Lake Charlotte will obtain the appropriate approvals prior to construction. For purposes of comparison, the functional capacity of a two-lane paved rural highway is in excess of 5,000 vehicles per day, AADT. Since most of the area roadways have AADTs that are well below capacity, this increased traffic may be perceptible to area residents, but the slight increase in volume is not expected to affect traffic function. Slow-moving construction vehicles may also cause delays on smaller roads, similar to the impact of farm equipment during planting or harvest. However, these delays should be minimal for the relatively short construction delivery period.

After construction is complete, traffic impacts during the operations phase of the Project will be negligible. A small maintenance crew driving through the area in pickup trucks on a regular basis will monitor and maintain the facilities as needed, but traffic function will not be impacted as a result.

Lake Charlotte reviewed the FAA Notice Criteria Tool to determine the need for filing 7460-1 Notice of Proposed Construction forms (refer to Appendix A). The results indicated the Project does not exceed the Notice Criteria. As such, Project facilities will not exceed obstruction standards and would not be a hazard to air navigation. No mitigation measures are anticipated or proposed for air traffic.

**Emergency Services**

Construction and operation of the Lake Charlotte Project will have minimal impacts on the security and safety of the local populace. Lake Charlotte will develop an Operations and Emergency Action Plan that outlines local contacts (first responders and internal operation and maintenance staff) and emergency procedures for evacuation, fire response, extreme weather, injury, and criminal behavior. Additionally, construction will comply with local, state, and federal regulations regarding installation of the Project facilities and standard construction practices. Established industry safety codes and procedures will be followed during and after construction of the Project; these include clear signage during all construction activities and fencing of all Project facilities to prevent public access. Hazard mitigation measures will be utilized to avoid BESS fire safety risks including storing lithium-ion batteries in weather-proof enclosures that include a fully integrated system of HVAC for temperature control, sensors, and controls for remote monitoring, and -built-in fire detection and suppression.

**Regional Utilities**

As described in Section 2.1, the Project will interconnect into the SMMPA Rutland Substation, which is adjacent to the Land Control Area. The Project is not anticipated to impact existing transmission lines that interconnect to this substation. During interconnection, customers may experience short outages when the SMMPA Rutland Substation is shut down and temporary service is being established. The timing and duration of any service interruptions would be determined and communicated to consumers by the interconnecting utility.

**Public Communications**

Lake Charlotte does not anticipate any impacts to existing utilities, such as public communication towers. If cell tower signal or broadband interference is identified during or after construction of the Project, Lake Charlotte will address the interference on a case-by-case basis and in accordance with the anticipated conditions of the Site Permits.

**Emergency Communications**

While there is an ARMER tower approximately 8.5 miles away from the Land Control Area, the Project will not impact this communication system as Project facilities are proposed below the typical height of a tower and line-of-sight near the top of these towers (i.e., greater than 150 feet

above ground). Lake Charlotte anticipates the structures for the gen-tie line to be less than 150 feet tall. As such, no mitigation is proposed.

### 5.2.9 Land Use and Zoning

#### 5.2.9.1 Land Use

Land use/cover information from the U.S. Geological Survey (USGS) National Land Cover Database (NLCD) was reviewed to identify existing land uses in the Land Control Area (USGS, 2023). Table 5.2.9-1 presents the NLCD land use/cover categories within the Land Control Area and Map 9 provides an overview of the NLCD land use/cover types in the Land Control Area.

**Table 5.2.9-1 Land Use Within the Land Control Area**

| Land Use Type | Acres in Land Control Area | Percent of Total Acreage |
|---|---|---|
| Agricultural [1] | 1,216.7 | 95.3% |
| Developed [2] | 59.9 | 4.7% |
| Emergent Herbaceous Wetlands[3] | 0.1 | <0.1% |
| Woody Wetlands | 0.1 | <0.1% |
| Forested | <0.1 | <0.1% |
| **PROJECT TOTAL** | **1,276.7** | **100.0%** |

[1] Agricultural land consists of the NLCD category cultivated cropland.
[2] Developed includes low intensity, medium intensity and open space.
[3] Wetland information from the NLCD data is less accurate than the information presented in Section 5.5.5.5, which is based on field delineation results.
Source: USGS, 2023

Most of the Land Control Area is within a rural landscape, and the NLCD data indicates that the primary land use category is agricultural (1,216.7 acres/95.3 percent). The remainder of the Land Control Area is characterized as developed land (59.9 acres/4.7 percent), with less than 0.1 acre/less than 0.1 percent of forested land, emergent herbaceous wetlands, and woody wetlands.

In the NLCD data used for Lake Charlotte's environmental analysis, agricultural land in the Land Control Area is used for cultivated crop production of predominantly corn and soybean crops. Developed land identified within the Land Control Area generally consists of public roads, the SMMPA Rutland Substation and associated infrastructure, and maintained land associated with residential/farmstead land. Emergent herbaceous and woody wetlands identified within the Land Control Area are primarily associated with Martin Lake along the perimeter of the Land Control Area. Forest land identified in the NLCD data is associated with the forested riparian areas along Martin Lake, Lake Charlotte, and the associated wetland complex. A detailed and more accurate description of wetlands within the Land Control Area, including a summary of the wetland field delineation, is provided in Section 5.5.5.

Several residences are adjacent to and concentrated along the Land Control Area perimeter where it abuts the southern municipal boundary of Northrop and in the southwestern Land Control Area along Charlotte Oaks Drive. In addition, several farmsteads and concentrations of agricultural outbuildings are directly adjacent to the Land Control Area, generally situated near public roads.

In addition to residences, a significant amount of development is present in Town of Northrop, to the north of and outside of the Land Control Area. A detailed count of residences within one mile of the Land Control Area is provided in Table 5.2.1-1.

#### 5.2.9.2 Zoning

A comprehensive plan is a land-use and community-planning tool used to guide the direction and intent of growth for a county or municipality. Generally, comprehensive plans discuss existing and future land uses, population and housing trends, economic development goals and opportunities, and environmental characteristics of the county or municipality.

The Region Nine Development Commission's (RNDC) planning documents and Martin County Zoning Ordinance (2008) were reviewed to identify any conflicts with the preliminary Project design as presented in this Joint Application. According to Martin County zoning information, the Land Control Area is primarily zoned as Agriculture, (A), and Shoreland Special Protection (SL-1) in areas adjacent to Martin Lake and a portion of Lake Charlotte and Shoreland Residential Recreation (SL-2) in the vicinity of Charlotte Oak Drive. Zoning information for the Land Control Area is shown in Map 10.

According to the 2015 Martin County Renewable Energy Ordinance (2015), the definition of a Solar Energy System includes both solar energy generating and storage equipment; given the size of the Solar Facility and BESS, the Project is specifically considered a Large Solar Energy System according to the Ordinance. The Ordinance states that Large Solar Energy Systems are conditionally permitted in the Agricultural Districts (A) and not permitted in Shoreland Special Protection (SL-1) and Shoreland Residential Recreation (SL-2).

Martin County is part of the RNDC, whose mission is to promote the development of the region through intergovernmental cooperation, community and human development, long-range planning and technical assistance. The RNDC's 2022-2026 Comprehensive Economic Development Strategy (RNDC, 2022-2026) includes a strategy to preserve natural assets, protect the natural environment, and sustain local and regional ecosystems while maintaining innovation and economic growth without impacting the way of life for future generations. The strategy encourages a just transition to clean energy. The RNDC tracks metrics that align with the region's comprehensive economic development strategies and the Minnesota Association of Development Organization's statewide plan (Minnesota Regional Development Organizations, 2019). This plan is a common framework for regional economic growth. The plan lists strategies to maintain and expand renewable energy production and invest in value-added opportunities from agricultural and forest products as well as strategies to explore incentives and expand renewable energy development while also developing land use objectives that balance economic competitiveness/resilience with human well-being and natural amenities preservation.

Lake Charlotte is coordinating with Martin County and Rutland Township to confirm that the Project is in alignment with applicable current and future zoning and to obtain any required permits or approvals not otherwise pre-empted by the state site permit process. Additionally, Lake Charlotte will coordinate with Martin County and the township on a road use agreement to protect local roads.

### 5.2.9.3 Impacts and Mitigation Measures

Within the 1,277-acre Land Control Area, approximately 1,004 acres will be needed to construct and operate the Project, based on the preliminary design described throughout this Joint Application; this 1,004-acre area is referred to as the Preliminary Development Area and includes both the Solar Facility and the BESS (refer to Figure 2.1-1). Table 5.2.9-2 provides the total acres of each USGS NLCD land use category within the Preliminary Development Area.

**Table 5.2.9-2 Land Use within the Preliminary Development Area**

| Land Use Type | Acres in Preliminary Development Area | Percent of Preliminary Development Area |
|---|---|---|
| Agricultural [1] | 997.8 | 99.4% |
| Developed | 6.2 | 0.6% |
| **PROJECT TOTAL** | **1,004.0** | **100%** |

[1] Agricultural land consists of the NLCD category cultivated cropland.
Source: USGS, 2023.

The predominant land use type within the Preliminary Development Area is agricultural land (997.8 acres/99.4 percent). Agricultural land will be converted to solar energy generation and battery storage use for the life of the Project. The conversion of agricultural land within the Preliminary Development Area will have a minimal impact on the availability of agricultural land in Martin County. As discussed further in Section 5.3.1, of the 467,200 acres in Martin County, approximately 97.2 percent (approximately 454,025 acres) are currently used for agricultural production (USDA, 2022). Conversion of 997.8 acres of land that is currently used for agricultural production to operate the Project would reduce the amount of actively cultivated agricultural land in the county by less than one percent.

Due to the amount of agricultural land in the Preliminary Development Area, Lake Charlotte developed an Agricultural Impact Mitigation Plan for the Project. Lake Charlotte met with the Minnesota Department of Agriculture (MDA) on March 13, 2025, to introduce the Project and discuss the contents of the Agricultural Impact Mitigation Plan and any site-specific measures that should be included. The Project Agricultural Impact Mitigation Plan incorporates best management practices (BMPs) for siting; pre-construction, construction, and post construction methods; operational procedures; and decommissioning and restoration procedures that will be used to avoid and minimize impacts on soil and site productivity such that pre-construction agricultural productivity is rapidly returned to the site following Project decommissioning. A copy of the Agricultural Impact Mitigation Plan was sent to MDA for review on April 23, 2025. MDA responded on May 8, 2025, and noted it had no edits to the plan. MDA further commented that MPUC is developing a new standard condition for site permits that addresses the requirements from various agencies to have an Environmental Monitor on site during construction. No updates are needed to the Environmental Monitoring section of the Agricultural Impact Mitigation Plan at this time, but MDA noted it intends to align its monitoring requirements with MPUC's new site permit requirement. A copy of the Agricultural Impact Mitigation Plan is provided in Appendix E.

A small amount of developed land (6.2 acres/0.6 percent) is also present in the Preliminary Development Area, primarily associated with public roads. Construction and operation of the

Project is not anticipated to impact developed land. Solar facilities will be setback from the county and township road rights-of-way that bisect the Project as well as from the Minnesota State Highway 15 right-of-way along the eastern limits of the Land Control Area. Electrical cables connecting the blocks of solar arrays will be directionally bored under public roadways. Similarly, areas categorized as emergent herbaceous and / or woody wetland, and forest land will not be impacted by the solar facility or the BESS facility (refer to Table 5.2.9-2).

As noted above, development of large solar energy and battery storage systems within the Martin County Agricultural District are conditionally permitted uses (Martin County, 2008). However, because the Project is subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, the Site Permits are the only land use permit required.

During early coordination with Martin County, the Martin County Drainage Systems Manager (Drainage Systems Manager) noted that county-maintained drainage systems are present within the Land Control Area and shared the digitally mapped locations of tile. The Drainage System Manager provided typical buffer distances from county drain tile to maintain sufficient area to allow for routine maintenance and repair and to avoid damage to the drain tiles. Lake Charlotte is coordinating with Martin County to identify ways to allow the Project and the existing county drain tiles to coexist for the life of the Project as well to identify opportunities to abandon or relocate portions of drain tile while maintaining flow patterns and Project integrity. With the support of affected landowners, Lake Charlotte has discussed the possibility of a petition to Martin County Drainage Commissioners to abandon and/or relocate portions of county drain tile within the Land Control and Preliminary Development Areas. Additional details about early coordination with Martin County are provided in Section 6.0 and copies of correspondence are provided in Appendix A.

### 5.2.10 Recreation

Lake Charlotte reviewed publicly available GIS information to identify recreation areas that could be affected by the Project. No federal, state, county, or locally owned or managed parks, forests, refuges, recreation areas, or wildlife conservation areas were identified within the Land Control Area. However, Segment #161 of the Prairieland Trail snowmobile trail crosses through the Land Control Area and is maintained by the Blizzard Snowmobile Club (MDNR, 2025a). The trail follows a series of public roads (i.e., 160th Street, County Highway 143, 170th Street and 175th Street), edges of agricultural fields and an area along High Lake. The trail is illustrated on Map 11. Additionally, a review of recent aerial imagery indicates that the Northrop Softball Field is 250 feet north of the Land Control Area within the Town of Northrop. Residences located along 170th Street are present between the softball field and the Land Control Area. A second softball field associated with Saint James Lutheran Church and the associated St. James Evangelical Lutheran School is located about 0.2 mile north of the Land Control Area; this softball field is also within the Town of Northrop.

#### 5.2.10.1 Impacts and Mitigation

Construction and operation of the Project is not anticipated to impact recreational opportunities on designated public lands as none are located within the Preliminary Development Area.

The Prairieland Trail snowmobile trail crosses through portions of the Land Control and Preliminary Development Areas following existing public roadways (refer to Map 11). Construction of the Project would occur in spring, summer, and fall seasons and is not anticipated to affect use of the snowmobile trail during the winter season. Construction of five access roads from County Highway 143 to the Project would create new driveways within the western and eastern road ditches along County Highway 143. However, several existing residential driveways and access drives to the Rutland Substation are already present along County Highway 143. The additional Project access points along County Highway 143 would be similar in size and height to the existing driveways and impacts to public use of this segment of the snowmobile trail are not anticipated. The segments of the snowmobile trail along 160th Street, 170th Street, 175th Street, the edges of agricultural fields, and the area along High Lake would not be impacted by the Project. In these locations, the trail is located outside of the proposed fenceline of the Project facilities, therefore, public use of the trail would not be obstructed by the presence of Project facilities.

In their early coordination memo dated April 4, 2025, the MDNR recommends coordination with the Blizzard Snowmobile Club to accommodate any changes to the Prairieland Trail route. Lake Charlotte will coordinate with the Blizzard Snowmobile Club to ensure any potential impacts to public use of the Prairieland Trail are minimized or avoided. As part of this coordination. Lake Charlotte will provide the locations of the new access points from County Highway 143 to the trail manager in advance of construction.

The softball fields within the Town of Northrup are not anticipated to be affected by construction or operation of the Project. Increased noise, traffic, and dust during construction of the Project may be noticeable to users of the softball fields, but given the distance between these areas and the Project and the presence of trees between each area and the Project, such increases are anticipated to be minor and temporary and would resolve with the completion of construction. Furthermore, Lake Charlotte will employ dust control techniques, as needed, during construction of the Project to minimize or avoid fugitive dust (refer to Section 5.5.1.1). Access to the softball fields in Northrup would not be affected by construction or operation of the Project as access points to the Project do not overlap with access points to the softball fields.

Construction of the Project is likely to overlap with various Minnesota hunting seasons. The timing of construction will be communicated to landowners within and adjacent to the Land Control Area in advance and the Land Control Area would be off limits to hunting during active construction. After construction is complete, hunting in areas adjacent to the Project would be allowed to continue as before, but no hunting would be allowed within the Project fencelines.

No additional impacts to recreational opportunities are anticipated and no additional mitigation measures are proposed.

### 5.2.11 Socioeconomics

Socioeconomic information for the Project Study Area is based on data from the U.S. Census Bureau's QuickFacts and Explore Census Data websites. The U.S. Census websites provide a wide variety of data points. The discussion herein does not address every socioeconomic measure but instead addresses the most applicable statistics related to the Project. The socioeconomic statistics that best characterize the demographic and economic context of the Project Study Area and

represent the socioeconomic characteristics that potentially could be affected by construction and operation of the Project include total population, percent population change, per capita income, the percentage of the population below poverty level, the unemployment rate, and the top three industries (refer to Table 5.2.11-1). Data are provided at the county level to characterize the socioeconomics in the Project Study Area and at the state level for the purpose of comparison.

**Table 5.2.11-1: Socioeconomic Characteristics of the Project Study Area**

| Demographic Category | Minnesota | Martin County | Northrop | Fairmont |
|---|---|---|---|---|
| 2020 Census Population (April 1, 2020) [1] | 5,706,692 | 20,027 | 193 | 10,487 |
| Population Estimates July 1, 2023 [1] | 5,737,915 | 19,657 | 212 | 10,240 |
| Percent Change 2010 - 2023[1] | +0.5% | -1.8% | +2.4% | -2.2% |
| Per Capita Income (U.S. Dollars) [1] | $46,957 | $37,466 | $30,677 | $39,233 |
| Unemployment Rate (%) [1] | 3.9 | 4.4 | 0 | 4.1 |
| Persons in Poverty (%) [1] | 9.3 | 13.2 | 13.2 | 12.4 |
| Top Three Industries [2,4] | E, M, R | E, M, R | A, E, M | E, M, R |

[1] U.S. Census Bureau, 2023a
[2] U.S. Census Bureau, 2023b
[3] U.S. Census Bureau, 2023c
[4] Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: A: Agriculture, Forestry, Fishing, and Hunting, and Mining; E = Educational, Health and Social Services; M = Manufacturing; R = Retail Trade.

The Project is in a rural area within Rutland Township and the nearest incorporated municipalities are the Town of Northrop and the City of Fairmont. Because of the proximity of these municipalities, comparable U.S. Census Bureau data is also provided.

Based on the U.S. Census Bureau data, the population of Martin County is 19,657 persons, which represents less than 1 percent of the total population of Minnesota. The per capita income of Martin County is $37,466, which is approximately $9,000 lower than the state average. The unemployment rate in Martin County, 4.4 percent, is higher than the state average of 3.9 percent, and the percentage of individuals classified as living below the poverty level in Martin County is higher than the state average at 13.2 percent and 9.3 percent, respectively. The primary industries in Martin County are classified as educational, health, and social services (24.0 percent), followed by manufacturing (16.2 percent), and retail trade (12.5 percent) (U.S. Census Bureau, 2023b).

On the municipal level, Fairmont and Northrop have a population of 10,240 and 212, respectively, which is approximately 52 and 1.1 percent of Martin County, respectively. The per capita income of Fairmont and Northrop is $39,233 and $30,677, which is approximately $2,000 higher and $7,000 lower than Martin County, respectively. Fairmont and Northrop have an unemployment rate of 4.1 and 0.0 percent, respectively, which is lower than Martin County. The people in poverty in Fairmont and Northrop make up 13.2 and 12.4 percent of the population, respectively, which is equal to Martin County for Fairmont and lower than Martin County for Northrop.

According to the Visit Fairmont Minnesota website, 5 hotels and motels and 6 campgrounds are available in the Fairmont area (Visit Fairmont, 2025). The nearest larger municipalities to the Land

Control Area are Mankato (34 miles northeast) and Albert Lea (51 miles east). Both cities are near enough to the Project to provide additional lodging options for construction personnel. According to Visit Mankato, 15 hotels and motels and 6 campgrounds are available in the City of Mankato (Visit Mankato, 2025). The City of Blue Earth has one hotel available (Blue Earth Chamber, 2025). These residence and temporary housing statistics suggest the local area could support an influx of construction workers, if needed.

#### 5.2.11.1 Impacts and Mitigation

The Project is designed to be socioeconomically beneficial to the landowners, local governments, and communities. Landowner compensation is established by voluntary leases or purchase agreements between the landowners and Lake Charlotte for lease or purchase of the land.

Construction of the Project will provide temporary increases to the revenue of the area through increased demand for lodging, food services, fuel, transportation and general supplies. The Project will also create new local job opportunities for various trade professionals that live and work in the area and it is typical to advertise locally to fill required construction positions. Opportunity exists for sub-contracting to local contractors for gravel, fill, and civil work. Additional personal income will also be generated by circulation and recirculation of dollars paid out by the Project as business expenditures and state and local taxes.

General skilled labor is expected to be available in Martin County or Minnesota to serve the Project's basic infrastructure and site development needs. Specialized labor will be required for certain aspects of the Project. It may be necessary to import specialized labor from other areas of Minnesota or neighboring states because the relatively short construction duration often precludes special training of local or regional labor and much of the workforce needed to construct a Solar Facility and BESS must be comprised of Minnesota licensed electricians because most of the assembly and wiring work for solar installations is considered electrical work under the Minnesota State Electrical Code.

Geronimo Power, Lake Charlotte's parent company, has a strong track record of using local labor for construction. In a recent example, for construction of the Louise Solar Project in Mower County, Minnesota (MPUC Docket No. IP-7039/GS-20-647), 90 percent of the total labor hours (106,261 of 117,800) were performed by Minnesota residents (as defined in Minn. Stat. 290.01, Subd. 7).

Lake Charlotte will issue a Request for Proposals to find contractors to construct the Solar Facility and BESS. In the Request for Proposals, Lake Charlotte will include a preference for contractor bids that propose to use local personnel to the greatest extent feasible while also aligning with the Project's budget, timeline, industry standards, and corporate safety policies. Lake Charlotte will also include language clarifying that contractor bids must comply with Minnesota's prevailing wage requirements as outlined in Minn. Stat. § 177.42. The contractor selected for the Project will be required to work with appropriate entities (e.g., labor unions, local subcontractors, and other vendors) to develop and implement a construction staffing model that maximizes local hiring and the local economic benefits for the Project, while ensuring the Project is safely built on time and on budget.

Temporary construction jobs will generate indirect economic benefits for the Study Area, as employees spend their income on local goods and services and pay local sales tax. During construction, an estimated 200 construction and service-related jobs will be created. Effects on temporary or permanent housing for construction personnel and long-term personnel are anticipated to be negligible. During construction, out-of-town laborers will likely use lodging facilities nearby. The operations and maintenance of the Solar Facility will require approximately three to four permanent personnel, while the operations and maintenance of the BESS will require approximately one to two permanent personnel. The Project anticipates that sufficient temporary lodging and permanent housing will be available within Martin County, and within Fairmont, to accommodate construction laborers and long-term personnel. However, additional lodging options exist in Mankato and Blue Earth, if needed during the period of construction.

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 will provide production tax payments to Martin County of approximately $287,000 estimated annually over 30 years. Additionally, Rutland Township will receive approximately $71,700 annually over 30 years. In addition, lease and purchase payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.

## 5.3 Land Based Economies

### 5.3.1 Agriculture

According to the USDA's 2022 Census of Agriculture, of the 467,200 acres that comprise Martin County, 454,025 acres (97.2 percent) are actively cultivated farmland. A total of 823 individual farms are located in Martin County, with the average farm size at 552 acres. The top crops (in acres) cultivated in Martin County include soybeans, corn, and foraging crops (hay and haylage, grass silage, and greenchop). Hogs and pigs top the list of livestock inventory in Martin County, followed by cattle and calves, poultry (layers), and sheep and lambs (USDA, 2022).

The market value of agricultural production in Martin County in 2022 was approximately $943 million. Livestock, poultry, and their products accounted for approximately 51 percent of the total value of agricultural production, while crops, including nursery and greenhouse crops, accounted for the remaining 49 percent (USDA, 2022). While cultivated cropland is present in the Land Control Area, no areas used for animal husbandry or special crop production are located within the Land Control Area.

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses. Current land use could be row crop agricultural production, pasture, woodland, or other land uses; not all prime farmland is currently used for agricultural production. Details about prime farmland within the Land Control Area are provided in Section 5.5.4.

The Conservation Reserve Enhancement Program (CREP) is an offshoot of the Conservation Reserve Program, which is a land conservation program established by the USDA and administered by the Farm Service Agency that pays farmers a yearly rental fee for agreeing to take

environmentally sensitive land out of agricultural production in an effort to improve environmental health and quality (USDA, n.d.). Minnesota implemented the CREP to target state-identified, high-priority conservation issues by offering payments to farmers and agricultural landowners to retire environmentally sensitive land using the Reinvest in Minnesota Reserve Program (Minnesota Board of Water and Soil Resources, 2025). Enrollment in the Conservation Reserve Program and CREP is voluntary and participation in the program comes with certain restrictions on the types of development allowed on parcels enrolled in the program, if such development is inconsistent with the conservation goals of the program. No CREP or Reinvest in Minnesota Reserve Program conservation easements within the Land Control Area.

During early coordination with Martin County, the Drainage Systems Manager noted that county -maintained drainage systems are present within the Land Control Area and shared the digitally mapped locations of tile. The Drainage System Manager provided typical buffer distances from county drain tile to maintain sufficient area to allow for routine maintenance and repair and to avoid damage to the county drain tiles. Lake Charlotte is coordinating with Martin County to identify ways to allow the Project and the existing county drain tiles to coexist for the life of the Project as well to identify opportunities to abandon or relocate portions of county drain tile while maintaining flow patterns and Project integrity. Additional details about early coordination with Martin County are provided in Section 6.0 and copies of correspondence are provided in Appendix A.

#### 5.3.1.1 Impacts and Mitigation Measures

Within the 1,277-acre Land Control Area, approximately 1,004 acres (i.e., the Preliminary Development Area) will be needed to construct and operate the Project, based on the preliminary design described throughout this Joint Application. Approximately 997.8 acres (99.4 percent) of the land in the Preliminary Development Area is agricultural land according to the USGS NLCD data (refer to Table 5.2.9-2). Agricultural land in the Preliminary Development Area will be converted to solar energy generation and battery storage use for the life of the Project. The conversion of agricultural land within the Preliminary Development Area will have a minimal impact on the availability of the agricultural land in Martin County. Of the 456,000 acres in Martin County, approximately 99.6 percent (approximately 454,025 acres) are currently used for agricultural production (USDA, 2022). Conversion of 997.8 acres of agricultural land to construct and operate the Project would reduce the amount of agricultural land in the county by approximately 0.22 percent and will not result in a significant impact to agricultural-based economies in the Project Study Area.

Agricultural production would continue in the surrounding areas in Martin County during construction and operation of the Project. The revenue lost from removing land from agricultural production will be offset by the leases and purchase options between Lake Charlotte and the landowners. Areas disturbed during construction will also be repaired and restored to pre-construction contours and characteristics to the extent practicable. This restoration will allow the Project's land surfaces to drain properly, blend with the natural terrain, re-vegetate, and avoid soil erosion. Agricultural production could be allowed to continue in the area within the Land Control Area but outside the fence of the Preliminary Development Area during construction and operation of the Project. Any areas outside of the fenceline that are not used for agricultural production will be seeded with the permanent seed mix in accordance with the Agricultural Impact

Mitigation Plan. Similarly, if haying or grazing vegetation management strategies described in the Vegetation Management Plan are used, some agricultural activities would continue within the Preliminary Development Area.

No CREP or Reinvest in Minnesota Reserve Program easements are located within the Land Control Area; therefore, no impacts on these conservation easements would occur as a result of the Project.

Based on discussions with Martin County, Lake Charlotte is aware of public and private drain tile in the Land Control Area. Lake Charlotte has obtained mapping of public drain tile from the Drainage Systems Manager for the Land Control Area and is working to obtain maps of private drain tile, as well. The drain tile mapping has been and will continue to be incorporated into the design of the Solar Facility and BESS.

The primary solar arrays in the preliminary design of the Solar Facility described throughout this Joint Application avoid the public drain tile. With the support of affected landowners, Lake Charlotte has discussed the possibility of a petition to Martin County Drainage Commissioners to abandon and/or relocate portions of public drain tile within the Land Control Area. If the petition is pursued and successful, and the portions of public drain tile in the northeast corner of the Land Control Area are approved for abandonment or realignment, Lake Charlotte proposes to update the Solar Facility design to place arrays in the northeast portion of the Land Control Area. To allow for design flexibility as coordination with Martin County continues, Lake Charlotte includes approximately 58 acres of alternate solar arrays in the impact discussions throughout this Joint Application. As such, the acres of the Preliminary Development Area (1,004 acres) are overstated. The alternate solar arrays are shown on Maps 3 and 4.

If damage occurs to public or private drain tile as a result of construction activities or operation of the Project, Lake Charlotte will repair any damages. More detail on drain tile identification, design considerations, construction measures, and operational measures is included in the Agricultural Impact Mitigation Plan (refer to Appendix E).

No areas used for animal husbandry are located within the Land Control Area; therefore, no impacts to livestock are anticipated.

### 5.3.2 Forestry

There are no forestry operations in the Land Control Area or Preliminary Development Area.

#### 5.3.2.1 Impacts and Mitigation Measures

Impacts on forestry operations from construction and operation of the Project will not occur.

### 5.3.3 Mining

Based on MNDOTs Aggregate Source Information System and County Pit Map for Martin County, there are no gravel pits within the Land Control Area (MNDOT, 2023 and 2000). In the Aggregate Source Information System data and on the Martin County Pit Map, nine gravel pits are shown between 0.4- and 2.0-miles north to northwest of the Land Control Area.

#### 5.3.3.1 Impacts and Mitigation Measures

No active or inactive mining operations are present in the Preliminary Development Area. As such, impacts on mining operations from construction and operations of the Project are not anticipated; therefore, no mitigative measures are proposed.

### 5.3.4 Tourism

Primary tourism activities in the vicinity of Project facilities are associated with the cultural and community events discussed in Section 5.2.2 and the recreational activities discussed in Section 5.2.10.

Examples of local community festivals include summertime events like the Martin County Fair, and the Interlaken Heritage Days hosted by the City of Fairmont (Martin County Fair, 2025; Interlaken Heritage Days, 2024).

#### 5.3.4.1 Impacts and Mitigation Measures

Lake Charlotte will construct the Project facilities within the limits of the Land Control Area and no road closures are anticipated to be necessary during active construction. The annual events hosted by the City of Fairmont are not held within or directly adjacent to the Land Control Area; most of these events are held within city limits or in areas outside of the Land Control Area. No impacts to public access to these events is anticipated during construction or operation of the Project.

No impacts on tourism are anticipated and therefore no mitigative measures are proposed.

## 5.4 Archaeological and Historic Resources

In addition to requiring Site Permits from the Commission, the Lake Charlotte Project is subject to the Minnesota Historic Sites Act (Minnesota Statutes 138.661-138.669), which requires state agencies to consult with the Minnesota State Historic Preservation Office (SHPO) regarding any potential impacts on state or federal designated or listed historic properties.

Lake Charlotte retained Tetra Tech to conduct a Phase I investigation to identify archaeological sites and historic structures that could be affected by the Project (Tetra Tech, 2024). The Phase I investigation for the Project was conducted in two phases. In 2022 and 2023, Tetra Tech conducted a background literature review (i.e., Phase Ia) and in-field pedestrian survey (i.e., Phase I) of an approximately 1,508-acre area that fully encompassed the current Land Control Area and extended further to the west, encompassing portions of the wetland complex that is present along the current western edge of the Land Control Area. The area within one mile of the 1508-acre area was also included in the background literature review, collectively referred to as the CR Study Area. The results of this Phase I investigation are summarized in Tetra Tech's 2024 Cultural Resource Assessment and Pedestrian Survey report (Tetra Tech, 2024).

The Land Control Area for the Project was later reduced to the 1,277-acre area described in this Joint Application and shown on Figure 2.1-1. In the spring of 2025, Tetra Tech conducted additional testing of seven newly recorded sites that were identified during the Phase I field

inventory and still fall within the current Land Control Area. The results of this additional investigation will be summarized in Tetra Tech's 2025 survey report, which is currently under development and will be submitted to SHPO for review when available. A summary of the findings is provided below.

### 5.4.1 Previously Documented Cultural Resources

The background literature review conducted by Tetra Tech was completed through a file review received from SHPO on September 20, 2022, and multiple reviews of the Office of the State Archaeologist archaeological site portal; the first review was conducted in September 2022 and the final review was conducted on April 4, 2024. Tetra Tech reviewed this data for archaeological and architectural resources that (1) are listed or potentially eligible for listing in the National Register of Historic Places (NRHP) or (2) may be deemed culturally sensitive. The background literature review also included a review of historical resources including county history, U.S. Department of the Interior General Land Office plats, county atlases, topographic maps, and aerial photographs. These documents were examined to identify historic structures, railroads, roads, and trails that could be affected by development of the Project.

The file review revealed two previous investigations have been conducted within the CR Study Area. As part of one of the investigations, two Precontact (unspecified) lithic scatters (Sites 21MR0046 and 21MR0047) were identified, and both are unevaluated for listing in the NRHP. As part of the other separate investigation one historic scatter (Site 21MR0054) was identified within the CR Study Area.

Four additional previously documented archaeological sites were identified outside the previous 1,508-acre area that was contemplated for the Project at that time, but within the CR study area. All four resources are unevaluated for listing in the NRHP. Of these four, two of the resources consist of burial mounds which overlook Martin Lake, outside of and west and northwest of the current Land Control Area. The remaining two resources included a historic scatter (21MR0054) west of the Land Control Area and west of Lake Charlotte and the ghost town of Horicon (21MRm) north of the Land Control Area. All of the previously recorded sites that were identified in the background literature review are outside of the current Land Control Area.

No previously inventoried architectural resources were identified within the 1,508-acre area; however, six previously inventoried architectural resources were identified within the broader CR study area. The architectural resources include three commercial buildings (within the Town of Northrop), one highway (Trunk Highway 15 immediately adjacent and east of the Land Control Area), one house (Town of Northrop), and one farmstead (southwest of the Land Control Area). None of the inventoried architectural resources are within the current Land Control Area.

A historical document review was conducted and identified six former structures and one former railroad within the 1,508-acre area. Five of the identified former structures were within the current Land Control Area. Most of the structures, with the exception of two, were not illustrated/observed after 1900. By the early 1990s, no structures were present within the Land Control Area. By 2021, all former structure locations were observed to be agricultural cropland. A former segment of the Chicago and Northwestern Railroad was historically located within the eastern portion of the current Land Control Area. By 1992, the railroad grade was labeled as "Old Railroad Grade" on

the 1992 photo-revised 1967 USGS 7.5-minute Fairmont, Minnesota Topographic Quadrangle and appeared to be cultivated on the USGS 1992 aerial photograph. By 2021, no linear signature of the former railroad could be observed on aerial photographs.

The background literature review did not identify previously documented archaeological sites or previously inventoried architectural resources within the current Land Control Area. Additionally, the potentially historic structures identified during the historic map review are no longer present within the current Land Control Area.

### 5.4.2 Phase I Field Inventory

The Phase I pedestrian survey was conducted by Tetra Tech archaeologists on October 19, 2022, May 22 through May 26, 2023, and on May 30, 2023. Again, Tetra Tech's pedestrian survey focused on a larger 1,508-acre area that fully encompasses the current Land Control Area and includes additional land that will not be used for the Project. Land use at the time of the pedestrian survey was primarily agricultural cropland with the exception of two non-cultivated areas near Lake Charlotte, and the isthmus between Lake Charlotte and a channel that connects Lake Charlotte and Martin Lake. Both non-cultivated areas are west of the current Land Control Area and would not be affected by the current Project design.

During the pedestrian survey, Tetra Tech reviewed the two archaeological resources (Sites 21MR0046 and 21MR0047) and identified 25 previously undocumented archaeological resources within the 1,508-acre area. Previously documented sites 21MR0046 and 21MR0047 and 17 of the 25 newly identified sites are outside of the current Land Control Area and would not be affected by the Project design described throughout this Joint Application; therefore, these resources are not summarized further herein. Table 5.4.2-1 lists the newly recorded sites that are within the Land Control Area.

**Table 5.4.2-1 Archaeological Sites Within the Land Control Area**

| Site Number | Type | Cultural Affiliation | NRHP Eligibility | Recommendations |
|---|---|---|---|---|
| 21MR0111 | Artifact scatter | Post-contact (Railroads and Agricultural Development) | Recommended unevaluated | Avoidance |
| 21MR0112 | Lithic scatter | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |
| 21MR0113 | Lithic scatter | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |
| 21MR0114 | Isolated find | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |
| 21MR0115 | Isolated find | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |
| 21MR0116 | Lithic scatter | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |
| 21MR0117 | Isolated find | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |

| Table 5.4.2-1 Archaeological Sites Within the Land Control Area | | | | |
|---|---|---|---|---|
| **Site Number** | **Type** | **Cultural Affiliation** | **NRHP Eligibility** | **Recommendations** |
| 21MR0118 | Lithic scatter | Precontact (temporally non-diagnostic) | Recommended not eligible | Avoidance not recommended |

One of the eight newly recorded sites that are within the current Land Control Area, Site 21MR0111, is recommended to have an increased potential to contain intact archaeological deposits below the plow zone based on the results of the pedestrian survey and Tetra Tech recommends avoidance of this site; the preliminary Project design presented in this Joint Application avoids this site.

The remaining seven newly recorded sites that are within the current Land Control Area were recommended by Tetra Tech to have limited potential to contain intact archaeological deposits based on the results of the pedestrian survey. However, while limited material was documented within the site extents during the pedestrian survey, Tetra Tech recommended shovel testing of these sites to confirm the presence or absence of intact culturally-bearing soil horizons below the plow zone. These seven sites are either temporally non-diagnostic Precontact isolated finds or lithic scatters.

In spring 2025, Tetra Tech conducted shovel testing of seven of the eight newly recorded sites that were identified within the current Land Control Area during the pedestrian survey. Site 21MR0111 will be avoided by the Project and was not tested to avoid unnecessary disturbance. Shovel testing of the seven newly recorded sites failed to identify any additional cultural material below the plow zone. Therefore, Tetra Tech recommends that these sites have a low potential to yield significant information to Precontact history in the region and are not eligible for listing in the NRHP.

### 5.4.3 SHPO Consultation

Tetra Tech plans to submit the Phase I survey report to the Minnesota SHPO in summer 2025. Lake Charlotte will provide the results of SHPO's review in a supplemental filing when available.

### 5.4.4 Impacts and Mitigation

With the exception of Site 21MR0111, the Phase I investigations of the Land Control Area in 2022, 2024, and 2025 did not identify archaeological sites or architectural resources eligible for listing or listed in the NRHP that would be affected by the proposed Project. Based on Tetra Tech's recommendations for avoidance, Lake Charlotte has designed the Project to avoid impacting Site 21MR0111. Therefore, the construction and operation of the Project would not affect historic properties listed in, eligible for, or potentially eligible for listing in the NRHP. No mitigation measures specific to archaeological or historic resources are proposed.

Before construction of the Project begins, Lake Charlotte will prepare an Unanticipated Discoveries Plan that will outline the steps to be taken if previously unrecorded cultural resources or human remains are encountered during construction.

## 5.5 Natural Environment

### 5.5.1 Air Quality

Section 109(b) of the Clean Air Act requires that the EPA establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and welfare (40 Code of Federal Regulations Part 50). The Clean Air Act identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children, and the elderly; and secondary standards which are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife, and structures. The EPA has promulgated NAAQS for six criteria pollutants: ozone ($O_3$), particulate matter ($PM_{10}$/$PM_{2.5}$), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), and lead (Pb). Minnesota is in compliance with the primary and secondary NAAQS for all criteria pollutants (MPCA, 2023b).

In Minnesota, air quality is tracked using air quality monitoring stations across the State. The MPCA uses data from these monitors to calculate the Air Quality Index, on an hourly basis, for ozone, particulate matter less than 2.5 microns in diameter, sulfur dioxide, nitrogen dioxide, and carbon monoxide. The pollutant with the highest Air Quality Index value for a particular hour sets the overall Air Quality Index for that hour. The Air Quality Index is used to categorize the air quality of a region as one of five levels of quality: good, moderate, unhealthy for sensitive groups, unhealthy, or very unhealthy (MPCA, 2025c).

The Project is located nearest to the air quality monitor in Marshall, Minnesota. This station monitors for ozone and $PM_{2.5}$. The Air Quality Index for Marshall for the past five years is provided in Table 5.5.1-1 (MPCA, 2025c). Note that data from 2024 is not available at the time this Application is filed.

**Table 5.5.1-1 Days in Each Air Quality Index Category (Marshall, Minnesota)**

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

Source: MPCA, 2025c

Air quality has been considered good or moderate for the majority of the past five reported years in Marshall. Since 2019, the largest number of days classified as moderate occurred in 2023. Thirteen days in 2021 and 2023, combined, were considered unhealthy for sensitive groups. Each of these days occurred between May and September and were likely the result of wildfire smoke. Two days each in 2021 and 2022, and three days in 2023, were considered unhealthy, most of which were the result of wildfires. No days have been classified as very unhealthy.

#### 5.5.1.1 Impacts and Mitigation Measures

Impacts on air quality from construction of the Project as proposed in this Joint Application would be minimal and limited to the period of construction. When necessary, dust from construction traffic will be controlled using standard construction practices such as watering of exposed surfaces, covering of disturbed areas, and reduced speed limits. In their Early Coordination memo dated April 4, 2025, the MDNR recommends avoiding chemical dust suppressants containing chloride, as this chemical does not break down in the environment and can accumulate to toxic levels for plants and wildlife. Emissions from construction vehicles will be minimized by keeping construction equipment in good working order. Overall, dust emissions currently experienced annually in the area through farming activities will be reduced for the life of the Project through the establishment of perennial vegetative cover.

Air emissions during construction would primarily consist of emissions from construction equipment and would include carbon dioxide, nitrogen oxides, and particulate matter. Dust from earthmoving activities would also contribute to particulate matter emissions. Impacts from the Project are expected to be negligible because of the temporary nature of the emissions and dust-producing construction phases. Applicable BMPs will be used during construction and operation of the Project to minimize dust emissions if the wind erosion becomes an issue. Estimated construction emissions are summarized below in Table 5.5.1-2. Detailed construction emission calculations are included in Appendix G.

**Table 5.5.1-2 Construction Related Criteria Pollutant Emissions**

| Construction Activity | CO (tpy) | NOX (tpy) | VOC (tpy) | $PM_{10}$ (tpy) | $PM_{2.5}$ (tpy) | $SO_2$ (tpy) |
|---|---|---|---|---|---|---|
| Off-Road Engines | 17.94 | 83.24 | 4.14 | 2.81 | 2.81 | 0.04 |
| Unpaved Road | - | - | - | 0.57 | 0.06 | - |
| Earthmoving | - | - | - | 178.53 | 18.85 | - |
| **PROJECT TOTAL** | **17.94** | **83.24** | **4.14** | **181.92** | **21.71** | **0.04** |

Note: CO = carbon monoxide, $NO_X$ = nitrogen oxides, VOC = volatile organic compound, $PM_{10}$ = particulate matter less than 10 microns in diameter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, $SO_2$ = sulfur dioxide, and tpy = tons per year.

Air permits are required for stationary sources of air emissions if the source has the potential to emit any regulated pollutant in amounts greater than permitting thresholds. Additionally, air permits are required for stationary sources that operate equipment that is regulated by the New Source Performance Standards (40 Code of Federal Regulations Part 60) or National Emissions Standards for Hazardous Air Pollutants (40 Code of Federal Regulations Parts 61 and 63) (MPCA, 2025d).

During operations, the Project may generate direct air emissions from operation of the emergency generator(s) and fuel storage tank(s). The emergency generator(s) and fuel storage tank(s) may be regulated by the New Source Performance Standards (40 Code of Federal Regulations Part 60) or National Emissions Standards for Hazardous Air Pollutants (40 Code of Federal Regulations Part

63). Once the final engineering design is complete, Lake Charlotte will submit an applicability determination request to the MPCA air quality permit program and will secure the appropriate level of air permit prior to beginning construction of the covered equipment, if needed. Some indirect emissions will be generated from commuter and maintenance vehicles; however, mobile sources of emissions are not regulated by the MPCA air permitting program.

### 5.5.2 Climate Change and Greenhouse Gas Emissions

The effects of climate change have been tied to an increase in greenhouse gas emissions from human-related activity, including transportation, energy production, and industry (EPA, 2024d). A key element in addressing climate change is the reduction of greenhouse gas emissions produced each year. In 2007, Minnesota passed the Next Generation Energy Act, which set statutory goals to reduce greenhouse gas emissions by 80 percent between 2005 and 2050 (MPCA, 2024a), from 177.5 million tons per year of $CO_2e$ in 2005 down to 88.8 million tons per year $CO_2e$ by 2030, Minnesota is currently on track to meet this goal (State of Minnesota, n.d.).

In February 2023, the Minnesota Legislature passed "100 Percent by 2040" legislation,[2] a carbon-free energy standard, which is likely to increase Minnesota's renewable energy needs by compelling utilities to obtain additional electricity from renewable sources beyond that currently required by the Renewable Energy Standards set forth in Minn. Stat. § 216B.1691 and further reduce carbon from energy sources. The "100 Percent by 2040" standard requires utilities to generate or procure sufficient electricity generated from a carbon-free technology, such as solar, equivalent to at least the percentages of the electric utility's total retail sales to retail customers in Minnesota by the end of the year indicated in Table 5.5.2-1.

**Table 5.5.2-1 Carbon Free-Standard Milestones**

| Year | Percent of Retail Electric Sales as Carbon-Free Energy |
|---|---|
| 2030 | 80% for public utilities; 60 % for other electric utilities |
| 2035 | 90% for all electric utilities |
| 2040 | 100% for all electric utilities |

The Project will contribute to Minnesota's on-going success in reducing greenhouse gas emissions by providing a renewable source of energy as an alternative to more carbon-intensive sources of energy, such as coal and natural gas.

#### 5.5.2.1 Impact of Project on Climate Change

The Project will offset a large quantity of greenhouse gas emissions by providing renewable electricity and will increase carbon sequestration of the soil by converting approximately 1,004 acres of predominately agricultural land to herbaceous land (refer to Section 5.3.1.1). However, some greenhouse gas emissions will be produced during the fabrication, construction, and operating phases of the Project. Estimated emission calculations from construction of the Solar Facility and BESS are provided in Appendix G.

[2] Governor Walz signed the "100 Percent by 2040" legislation into law on February 7, 2023.

During operation, the Project is expected to produce enough renewable electricity to service 32,067 homes and to offset approximately 258,490 tons per year $CO_2e$. This is equivalent to removing nearly 60,294 passenger vehicles from the road annually (EPA, 2024a). In addition, the Project will convert approximately 1,004 acres of predominately row crop agricultural land to herbaceous land. Agricultural lands and herbaceous lands can both act as carbon sinks. The carbon storage capacity of herbaceous lands is about 65 percent higher than that of agricultural lands (Walston et al, 2021).

Greenhouse gas emissions are generated throughout the life of a solar project at a rate of about 42 grams $CO_2e$ per kilowatt hour (Schlömer et al, 2014). The Project is expected to generate 19,968 tons per year $CO_2e$ averaged over the 30-year project lifetime. These emissions will not be uniformly generated. Approximately 60-70 percent of these emissions occur during the upstream manufacturing and construction stage. Operational processes, including lighting, emergency generators, and maintenance activities, account for 21-26 percent of these emissions. The final 5-20 percent of greenhouse gas emissions are expected due to decommissioning and disposal of Project components (NREL, 2012).

Activities associated with the construction of the Project will result in greenhouse gas emissions from the combustion of diesel and gasoline in heavy construction equipment, delivery vehicles, and worker passenger vehicles. Emissions from construction activities were calculated by estimating the volume of fuel expected to be consumed by each piece of equipment and determining the greenhouse gas emissions released upon combustion of those fuel volumes. Construction activities are expected to produce a total of 3,650.88 tons $CO_2e$. Greenhouse gas emissions from construction vehicles will be minimized by keeping construction equipment in good working order. Upon completion of the construction activities, emissions from heavy equipment, delivery vehicles, and construction personnel will cease. A summary of construction-related greenhouse gas emissions is included in Table 5.5.2-2. Detailed construction emission calculations are included in Appendix G.

**Table 5.5.2-2 Construction Related Greenhouse Gas Emissions**

| Construction Activity | $CO_2$ (tpy) | $CH_4$ (tpy) | $N_2O$ (tpy) | $CO_2e$ (tpy) |
|---|---|---|---|---|
| Off-Road Engine Emissions | 3,638.92 | 0.15 | 0.03 | 3,650.88 |
| Commuters and Delivery Vehicles | 951.39 | 0.00 | 0.00 | 951.39 |
| **PROJECT TOTAL** | **4,590.31** | **0.15** | **0.03** | **4,602.27** |

Note: $CO_2$ = carbon dioxide, $CH_4$ = methane, $N_2O$ = nitrous oxide, $CO_2e$ = carbon dioxide, equivalent, and tpy = tons per year. $CO_2e$ is calculated using the methodology outlined in Code of Federal Regulations Title 40 Part 98 Subpart A.

During the operational stage, up to six permanent full-time workers will staff the Solar Farm and BESS. Maintenance activities will require the use of two maintenance trucks per day. The commuter vehicles and maintenance trucks will generate a minor amount of greenhouse gas emissions. Utilities required to support the operation of the Solar Farm and BESS include electricity, water, and sanitation. Approximately 1,350 kilowatt hours per month of electricity may be purchased from the grid if needed to meet operational needs such as lighting, cameras, and

comfort heating. If needed during an emergency, the emergency generator(s) may generate emissions from fuel combustion. In total, approximately 71.3 tons per year of $CO_2e$ will be generated per year during the operating phase of the Project.

Lake Charlotte plans to install a private well or tie into rural water service, if available, and install a septic field to support operations. Approximately 600 gallons of water are expected to be used per day. This minor use of water is not expected to have a noticeable impact on the water supply. The septic system is expected to process 600 gallons per day. The septic system will be designed, installed, and maintained to withstand weather events associated with climate change, including increased heavy rains.

#### 5.5.2.2 Impact of Climate Change on Project

The MDNR publishes historical climate data from the years 1895 to 2025. This data shows that the average temperature of Martin County, Minnesota has been increasing at a rate of 0.20 degrees Fahrenheit per decade to reach an annual average temperature of 45.91 degrees Fahrenheit in 2024. Over the 30-year lifespan of the Project, the annual average temperature could increase by 0.60 degrees Fahrenheit. The annual precipitation has increased at a rate of 0.34 inches per decade to 31.18 inches in 2024. Over the lifespan of the Project, precipitation could increase an additional 1.2 inches per year (MDNR, 2025b). The MDNR climate office has defined mega-rain events as rainfalls of more than 6 inches over 1,000 square miles in 24 hours or less. Sixteen mega-rain events have been recorded in the past 50 years. Of these, 11 events have occurred since the year 2000 (MDNR, 2024c). Over the next 30 years, Martin County is predicted to have minor risk of flooding (First Street, 2025). Martin County experienced a period of extreme drought in 2004, 2012, 2013 and 2021. Currently, the county is ranked as severe drought (U.S. Drought Monitor, 2025). The Project has been designed with consideration of the potential climate changes during the lifetime of the Project, including increased heavy rainfalls, stronger wind gusts, and increased temperatures.

#### 5.5.2.3 Impacts and Mitigation Measures

Greenhouse gas emissions from human-related activity are a contributing factor to climate change. The Project is a mitigative measure that will reduce the effects of climate change by offsetting greenhouse gas emissions compared to electricity production by coal or natural gas fired power plants. Additionally, the Project will increase the carbon sequestration and water management capacity of approximately 1,004 acres of land in the Preliminary Development Area.

The Project has been designed and sited to withstand the weather events typically experienced in southwestern Minnesota, as well as the potential for increased severity of storms and periods of drought due to climate change discussed above (MPCA, 2025e). In an effort to minimize impacts on the facility infrastructure and equipment, the Project location was selected to avoid areas subject to flooding and pooled water during a 100-year rainfall event. Permanent drainage systems and stormwater ponds are sized appropriately to store and treat precipitation from more severe storms. Additionally, perennial vegetation plantings will replace current row crop agriculture in the Preliminary Development Area, increasing water uptake and slowing runoff.

Southern Minnesota can experience a range of weather events including high winds, hail, high and low temperatures, and heavy snowfall. Solar modules and related equipment will be designed to withstand storms that are potentially stronger than normal with minimal equipment downtime. During operation, Lake Charlotte will use industry best practices to reduce the impact of high winds and weather events, including options such as optimized stow regimes to reduce equipment exposure and installing dampening equipment to reduce oscillation during high winds. The system will be designed so that equipment can be isolated when necessary and includes an appropriate level of redundancy to allow for maintenance, repairs, and potential replacement of equipment damaged by storms. Lighting will be provided throughout the site to allow for adequate visibility during nighttime repairs.

Project infrastructure will be designed to comply with all applicable industry, local, and state building codes and standards. Civil and structural design will include safety factors for increased wind and snow loads, as set by the current standards. The electrical system will be designed for reliability, robustness, and compliance with the current codes and standards.

### 5.5.3 Geology and Groundwater

#### 5.5.3.1 Geology

The Land Control Area is located in the Minnesota River Prairie subsection of the North Central Glaciated Plains section of the Prairie Parkland Province as classified by the MDNR Ecological Classification System. This subsection consists of gently rolling ground moraines composed of till plains, with areas of end moraines and lake plains. Topography ranges from level, flat ground to steep kames and slopes along the Minnesota River and Big Stone Moraine. Approximately 100 to 400 feet of glacial till sits over Paleozoic-aged bedrock (refer to Map 12) (MDNR, 2025c). The Minnesota Geological Survey County Atlas indicates the depth to bedrock within the Land Control Area ranges from approximately 132 feet to 393 feet, with an average of 245 feet (Minnesota Geological Survey, 2025). Bedrock within the Land Control Area includes sedimentary deposits of sandstone and dolostone belonging to the Tunnel City and Prairie du Chien Groups, which date back to the early Paleozoic era (Jirsa et al., 2010).

Karst landscapes can develop where limestone and dolostone are at or near the surface. Limestone is composed mostly of the mineral calcite (calcium carbonate); dolostone is composed mostly of the mineral dolomite (calcium magnesium carbonate). Over time, the carbonate minerals in these rocks are dissolved by rain and groundwater, creating karst topography. In Minnesota, limestone and dolostone underlie the southeastern corner of the state, and erosion has removed most of the glacial cover exposing the carbonate bedrock. Karst topography is characterized by sinkholes, caves, springs, and underground drainage dominated by rapid conduit flow. The MDNR has documented regions prone to surface karst feature development across the state; however, none of these regions are located in the Land Control Area. The closest surface karst feature is a spring located in the Krahmer Wildlife Management Area approximately 10 miles to the southeast of the Land Control Area (MDNR, 2024d).

#### 5.5.3.2 Groundwater

The Land Control Area is located in MDNR Groundwater Province 2 (South Central), which is characterized by thick loam and clay loam glacial sediment. Limited extents of surficial and buried sand aquifers are located within the province, with thick sandstone and carbonate aquifers from the Paleozoic era located beneath (MDNR, 2021).

Lake Charlotte reviewed publicly available GIS data to identify EPA-designated sole source aquifers, wells listed on the County Well Index, Drinking Water Supply Management Areas, and MDH Wellhead Protection Areas. Sole source aquifers, Drinking Water Supply Management Areas, and Wellhead Protection Areas were not identified in the Land Control Area.

The EPA defines a sole source aquifer or principal source aquifer area as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2024e). According to the EPA Sole Source Aquifers webmap, there are no EPA designated sole source aquifers within the Land Control Areas (EPA, 2024f).

The County Well Index is a database that contains subsurface information for over 533,000 water wells drilled in Minnesota. The County Well Index is maintained by the Minnesota Geological Survey in partnership with the MDH. The data is derived from water-well contractors' logs of geologic materials encountered during drilling (MDH, 2022). According to the County Well Index, one active domestic use well and three sealed, environmental bore wells exist within the Land Control Area (see Table 5.5.3-1). One unverified, active, domestic use well (Well ID 640741) is displayed as existing within the Land Control Area. Per the Well and Boring Record, this well is associated with a residential structure and was installed west of 210th Avenue and north of a driveway. This location appears to correspond with property to the north of the Land Control Area (MDH, 2022). The domestic well data indicate that the depth to groundwater in the Land Control Area is approximately 45 feet.

**Table 5.5.3-1 County Well Index Records Within the Land Control Area**

| Well Name | Well ID | Well Use | Well Status | Static Water Depth | Verified/Unverified |
|---|---|---|---|---|---|
| L.B. Pork | 580170 | Domestic | Active | 45 feet | Verified |
| Terracon | 342474 | Environmental | Sealed | 5 feet | Verified |
| Terracon | 342475 | Environmental | Sealed | 6 feet | Verified |
| Terracon | 342478 | Environmental | Sealed | 16.5 feet | Verified |

Source: MDH, 2022

In addition, the following wells are located outside the Land Control Area but within 550 feet of the boundary:

- Four unverified, active, domestic use wells, located to the north, east, and within excluded property surrounded by the Land Control Area

- Two unverified, unknown if active, domestic use wells, located to the east and within excluded property surrounded by the Land Control Area
- Four verified, active, domestic use wells, located to the east, west, and within excluded property surrounded by the Land Control Area
- One verified, active, livestock well, within excluded property surrounded by the Land Control Area
- Two verified, sealed, environmental boreholes, located to the west and east

The MDH enforces the federal Safe Drinking Water Act including the National Primary Drinking Water Regulations created under the Act. These regulations are legally enforceable standards and treatment techniques that apply to public water systems to protect drinking and source water. As a result, Minnesota adopted the State Wellhead Protection Rule 4720.5100-4720.5590 in 1997 (MDH, 2024). The MDH is responsible for administering the State Wellhead Protection Program. Under the Wellhead Protection Program, public water systems are required to develop and implement a plan that protects its drinking water source. Wellhead Protection Areas are approved surface and subsurface areas surrounding a public water supply well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field (MDH, 2019). Drinking Water Supply Management Areas contain the Wellhead Protection Areas but are outlined by clear boundaries, like roads or property lines. The Drinking Water Supply Management Area is managed in a Wellhead Protection plan, usually by a city. There are no Drinking Water Supply Management Areas or Wellhead Protection Areas located within the Land Control Area. The nearest Wellhead Protection Area is the Northrop Wellhead Protection Area, located approximately 0.15 miles to the north of the Land Control Area. The Northrop Drinking Water Supply Management Area abuts the eastern portion of the Land Control Area, located to the north. Both the Wellhead Protection Area and Drinking Water Supply Management Area are associated with the City of Northrop (MDH, 2019).

#### 5.5.3.3 Impacts and Mitigation Measures

Impacts to geology and groundwater resources from construction and operation of the Project are not anticipated. The potential for the Project to impact these resources is limited. Due to the thickness of surficial materials (approximately 245 feet on average) excavation or blasting of bedrock is extremely unlikely (Minnesota Geological Survey, 2025). Impacts on geologic resources are not anticipated and mitigation is not expected to be necessary.

Impacts on groundwater resources, including aquifers, are not anticipated as water supply needs will be limited. In addition, the depth of piers is only anticipated to reach a maximum depth of 15 feet (refer to Section 4.1.1.1) and nearby wells indicate an average static water level of 50 feet. Geotechnical analysis will also be completed prior to pier installation to determine soil characteristics (refer to Section 4.4.1.1). Project facilities are not likely to affect the use of existing water wells, as no wells are located within the Preliminary Development Area. The closest verified active, domestic use well (Well ID 726566) is located approximately 110 feet to the west of the Preliminary Development Area. One active, domestic use well (Well ID 640741) contains an unverified location within the Preliminary Development Area, within the proposed substation area. Per the Well and Boring Record, this well is associated with a residential structure and was installed

west of 210th Avenue and north of a driveway. This location appears to correspond with property to the north of the proposed substation area, approximately 150 feet west of the Preliminary Development Area and approximately 90 feet west of the Land Control Area. Any dewatering required during construction will be discharged to the surrounding upland surface areas, thereby allowing it to infiltrate back into the ground to minimize potential impacts. Dewatering filter bags, straw structures or similar best management practices may be used when dewatering. Any areas affected by dewatering or associated materials will be restored (refer to Section 4.4.5). If dewatering is necessary, the Project will obtain a Water Appropriation Permit from MDNR.

O&M building and BESS water requirements will be satisfied with a single domestic-sized water well or via a tie in with rural water lines where available. Applicable permits related to construction and operation of a water well will be obtained, if a well is required to be drilled. Based on the small amount of impervious surface area that will be created by the Project components, estimated to be 21.4 acres for the Solar Facility and 15.9 acres for the BESS, the Project will likely have minimal impacts on regional groundwater recharge. the Project will likely have minimal impacts on regional groundwater recharge.

Concrete foundations may be required for some Project components and geotechnical soil testing will determine the final installation process. Similarly, the exterior security fencing may require concrete foundations in some locations. If concrete is needed, it will be locally sourced; an on-site concrete batch plant will not be required for the Project. Concrete foundations have the potential to impact aquifers or impede groundwater movement; however, given the limited depth and size of potential concrete foundations (refer to Section 4.4.1), it is unlikely that they will have an impact on the groundwater in the area.

Most land within the Preliminary Development Area will be vegetated in accordance with the Vegetation Management Plan, thereby minimizing the risk of impacts on private wells in the area. Vegetated ground cover will prevent the sedimentation of surface water and also aid in the filtration of contaminants from surface water prior to infiltration into the ground. Construction of the Project facilities is not anticipated to require subsurface blasting; therefore, disturbances to groundwater flow from newly fractured bedrock are not anticipated.

Prior to the start of construction, Lake Charlotte will obtain a National Pollutant Discharge Elimination System permit from the MPCA to discharge stormwater from construction facilities. Best management practices will be used during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion, whether the erosion is caused by water or wind. Practices may include containment of excavated material, protection of exposed soil, stabilization of restored material, and treating stockpiles to control fugitive dust. Best management practices may include, but are not limited to, silt fence, erosion control blanket, straw bales, or temporary seeding. A SWPPP will be developed for the Project prior to construction that will include best management practices such as silt fencing (or other erosion control devices), revegetation plans, and management of exposed soils to prevent erosion. Lake Charlotte will submit the SWPPP to MPCA for review and approval prior to construction and obtaining coverage under the General Construction Stormwater Permit.

### 5.5.4 Soils

Soil characteristics within the Land Control Area were assessed using the Soil Survey Geographic database (SSURGO) (Soil Survey Staff, 2025). The SSURGO database is a digital version of the original county soil surveys developed by the USDA Natural Resources Conservation Service (NRCS) for use with GIS. It provides the most detailed level of soils information for natural resource planning and management. Soil maps are linked in the SSURGO database to information about the component soils and their properties (USDA, NRCS, 2025). Table 5.5.4-1 and Map 13 show the soil types located within the Land Control Area.

Approximately 66.9 percent of the Land Control Area is underlain by hydric soils or soils containing hydric inclusions, indicating some wetlands are likely to be present as one of many wetland characteristics is hydric soil (refer to Section 5.5.5). None of the soils in the Land Control Area are prone to wind or water erosion. Approximately 69.1 percent of the Land Control Area is underlain by soils that are prone to compaction. Additional discussion about the soil map units within the Land Control Area and their corresponding soil characteristics can be found in the Agricultural Impact Mitigation Plan (refer to Appendix E).

Soils prone to compaction and rutting are subject to dramatic and adverse changes in soil porosity and structure as a result of mechanical deformation caused by heavy equipment during construction. Compaction and rutting are related to moisture content and texture and are worse when medium and fine textured soils are subject to heavy equipment traffic when wet. Soils in the Land Control Area are prone to compaction and rutting (refer to Appendix E).

**Table 5.5.4-1 Summary of Soils within the Land Control Area**

| Map Unit Symbol | Map Unit Name | Land Control Area (acres / %) | Farmland Designation [a] | Hydric Soil [a] | Wind Erodible [b] | Water Erodible [c] | Compaction Prone [d] | Slope Range [e] | Drainage Class |
|---|---|---|---|---|---|---|---|---|---|
| 102B | Clarion loam, 2 to 6 percent slopes | 0.4 / 0.0% | All areas are prime farmland | No | No | No | No | 0-5% | Moderately well drained |
| 112 | Harps clay loam, 0 to 2 percent slopes | 6.4 / 0.5% | Prime farmland if drained | Yes | No | No | Yes | 0-5% | Poorly drained |
| 118 | Crippin loam, 1 to 3 percent slopes | 150.5 / 11.8% | All areas are prime farmland | No | No | No | No | 0-5% | Somewhat poorly drained |
| 1834 | Coland clay loam, 0 to 2 percent slopes, frequently flooded | 0.2 / 0.0% | Not prime farmland | Yes | No | No | Yes | 0-5% | Poorly drained |
| 336 | Delft clay loam, 0 to 2 percent slopes | 7.7 / 0.6% | Prime farmland if drained | Yes | No | No | Yes | 0-5% | Poorly drained |
| 86 | Canisteo clay loam, 0 to 2 percent slopes | 0.8 / 0.1% | Prime farmland if drained | Yes | No | No | Yes | 0-5% | Poorly drained |
| 886 | Nicollet-Crippin complex | 16.9 / 1.3% | All areas are prime farmland | No | No | No | Yes | 0-5% | Somewhat poorly drained |
| 887B | Clarion-Swanlake complex, 2 to 6 percent slopes | 209.9 / 16.4% | All areas are prime farmland | No | No | No | No | 0-5% | Moderately well drained |
| 921C2 | Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded | 30.2 / 2.4% | Farmland of statewide importance | No | No | No | No | >5-8% | Well drained |

**Table 5.5.4-1 Summary of Soils within the Land Control Area**

| Map Unit Symbol | Map Unit Name | Land Control Area (acres / %) | Farmland Designation [a] | Hydric Soil [a] | Wind Erodible [b] | Water Erodible [c] | Compaction Prone [d] | Slope Range [e] | Drainage Class |
|---|---|---|---|---|---|---|---|---|---|
| 960D2 | Omsrud-Storden complex, 10 to 16 percent slopes, moderately eroded | 3.4 / 0.3% | Not prime farmland | No | No | No | No | >8-15% | Well drained |
| L107A | Canisteo-Glencoe complex, 0 to 2 percent slopes | 815.1 / 63.8% | Prime farmland if drained | Yes | No | No | Yes | 0-5% | Poorly drained |
| L84A | Glencoe clay loam, 0 to 1 percent slopes | 23.7 / 1.9% | Prime farmland if drained | Yes | No | No | Yes | 0-5% | Very poorly drained |
| L85A | Nicollet clay loam, 1 to 3 percent slopes | 11.4 / 0.9% | All areas are prime farmland | No | No | No | Yes | 0-5% | Somewhat poorly drained |
| **PROJECT TOTAL** | | **1,276.7 / 100.0%** | | | | | | | |

Source: Soil Survey Staff, 2025.

[a] Obtained directly by query of the Soil Survey Geographic geospatial database.

[b] Includes soils in wind erodibility groups 1 and 2.

[c] Includes soils with a slope greater than 15 percent or soils with a K value of greater than 0.35 and slopes greater than 5 percent.

[d] Includes soils that are somewhat poorly drained to very poorly drained soils in loamy sands and finer textural classes.

[e] Representative slope values are taken directly from the SSURGO database. The SSURGO database provides representative slope values for all component soil series. Slope classes represent the slope class grouping in percent that contains the representative slope value for a major component soil series. For example, a soil mapped in the 2-6% slope class has an average slope of 4%, which is within the 0-5% slope range.

Slope is a land surface characteristic that affects constructability, water erosion, revegetation, compaction and rutting, among other properties. Nearly all of the soils (1,243.1 acres, 97.4 percent) within the Land Control Area are nearly level soils with representative slopes falling within the 0 to 5 percent slope range. Of the remaining soils within the Land Control Area, 30.2 acres (2.4 percent) have a representative slope range of 5-8 percent and 3.4 acres (0.3 percent) have a representative slope range of 8-15 percent (refer to Appendix E). As such, slope is not anticipated to create issues during construction or restoration of the Project.

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses. Current land use could be row crop agricultural production, pasture, woodland, or other land uses; not all prime farmland is currently used for agricultural production. Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating) (USDA NRCS, 2025).

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate State agencies, typically in association with local soil conservation districts or other local agencies. Table 5.5.4-1 lists the soils considered prime farmland and soils of statewide or local importance within the Land Control Area. Map 14 depicts the distribution of prime farmland, prime farmland if drained, and not prime farmland in the Land Control Area.

#### 5.5.4.1 Impacts and Mitigation Measures

**Soils**

Impacts and mitigation for soils are described at a high level below. A more detailed discussion is provided in the Agricultural Impact Mitigation Plan (refer to Appendix E).

Approximately 19.1 percent of soils that will be impacted by the Project are well drained or moderately well drained and suited for the existing agricultural production without the need for additional artificial drainage. The Project is located on level to nearly-level topography, which is consistent with the current use for agricultural production.

Impacts to soils will occur during the construction and decommissioning stages of the Project. Construction may require some amount of grading to provide a level surface for the solar arrays, collector substation, and BESS. Because the Preliminary Development Area is in relatively level existing agricultural fields, the Project will minimize grading to the extent practicable. The extent

of grading necessary to construct and operate the Project will be determined prior to construction. Additional soil impacts during construction will come from the installation of the direct-embedded piers that support the structural framework of the solar arrays, and small areas of foundations for the inverter skids, the collector substation, O&M building, and BESS. Based on the electrical configuration, impacts to soils will differ. Should the below-ground collection configuration be used, installation of electrical cables will require trenching the cables to a depth of four feet below grade for installation. If the hybrid collection system is used, soil impacts due to trenching will be limited to the areas between the rows of panels to the inverter / transformer skids and then to the collector substation as described in Section 4.1.1. From a soils perspective, the hybrid collection system will have fewer soil impacts than the below-ground system due to the reduced volume of trenching necessary. Details about construction and operation activities for the Solar Facility and BESS are provided in Sections 4.1.1 and 4.1.2, respectively.

Areas of the site to be graded will have topsoil and organic matter stripped and segregated from the subsoil. Topsoil shall have temporary and permanent stabilization measures established in accordance with the Project's SWPPP. These measures would primarily include silt fencing on the downside of all hills, near waterways, and near drain tile inlets. This silt fencing would control soil erosion via stormwater. Check dams and straw waddles will also be used to slow water during rain events in areas that have the potential for high volume flow. Additional discussion on temporary erosion and sediment control measures that will be utilized can be found in the Agricultural Impact Mitigation Plan (refer to Appendix E). Internal roads will be constructed of inorganic fill (road aggregate base) to match the surrounding existing ground elevations to allow existing drainage patterns to persist. Once the necessary grading is complete, subsoil will be placed followed by topsoil, blending the grade into existing topography. Decompaction with chisel plows prior to disking and planting will typically be a standard method of soil preparation in areas proposed for seeding to native grasses, forbs, and pollinator species. Agricultural equipment capable of operating within the approximate 19-foot-wide space between panel lines when panels are oriented vertically would be used to decompact, prepare a seedbed, and plant suited seed mixes.

Following construction, Lake Charlotte will restore disturbed areas to pre-construction conditions to the extent practicable. Soil erosion will be minimized by implementing environmental protection measures. These measures will include BMPs for wildlife-friendly erosion and sediment control, such as temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. Compaction and rutting are potential limitations in the Preliminary Development Area. Lake Charlotte will design construction access and manage construction passes to minimize the number of trips occurring on a given soil and will implement wet weather procedures any time that rutting is observed. Deep compaction is not anticipated to be a significant problem as the number of construction equipment passes over a given area is limited, and construction equipment consists of smaller, low-ground-pressure tracked vehicles, however, Lake Charlotte will follow measures outlined above and as outlined in the Agricultural Impact Mitigation Plan (refer to Appendix E) to assess and address compaction in the Land Control Area.

Additionally, recent research on the environmental impacts of solar farms indicates that there could be some net benefits to soil resources over the lifecycle of the Project. Writing in Cleantechnica, one of the world's top cleantech-focused news sites, engineer Jeff Broberg highlights the utility and specific benefits of using native plants on solar sites (Broberg, 2016).

*"[Compared to row crops,] storm water runoff is reduced 23 percent for the 2-year storm (2.9 inches of rain) and 8 percent for the 100-year storm.*

*Further, we expect a mix of prairie plants to provide superior hydrologic performance compared to monocrop turf-grasses that are common on solar sites in some areas of the country. In 2008, the U.S. Geological Survey completed a five-year storm water study in cooperation with a consortium of 19 cities and towns in the area of Madison, Wisconsin that revealed 'striking differences between turf and prairie vegetation.'*

*The study found 'prairie vegetation had greater median infiltration rates than those with turf grass,' and roots in the prairie vegetation plot were 'found to a depth of 4.7 feet compared with 0.46 feet in the turf.*'

*In addition to superior stormwater management, native plants improve the soil with organic matter over the 20 to 30-year life the Project, allowing microorganisms and soil fauna to recover after years of intensive compaction and pesticide and fertilizer application. And, over time, native plants out-compete weeds allowing ground cover to be maintained with just a single annual mow, reducing operating costs."*

With the proper implementation of environmental protection measures intended to prevent, minimize, and/or reclaim soil erosion effects, no unmitigated loss of soil will result from the Project. Additionally, taking 1,004 acres of agricultural land out of production will give the soils an opportunity to rest and regenerate. Agricultural land within the fenced area of the Solar Facility will be converted to open, herbaceous (i.e., grassland) cover with the exception of the Project Substation and O&M building, BESS, inverters, and access roads which will be converted to developed land and impervious surfaces (37.2 acres). Lake Charlotte will utilize a shorter prairie seed mix within the panel footprint, taller prairie plantings in the open spaces between the fence and array, and a wet seed mix for wet areas including wetlands. The mixes are designed to be native and are developed with prairie specialists to design a mix that will allow for successful operation of the solar facility, promote pollinator habitat, establish stable ground cover successfully, reduce erosion, reduce runoff, and improve infiltration. Seed mixes that will be used for the Project are discussed in more detail in the Vegetation Management Plan in Appendix C.

## Prime Farmland

As shown in Table 5.5.4-2, nearly all of the soils within the Preliminary Development Area are classified as prime farmland, prime farmland if a limiting factor is mitigated or farmland of statewide importance; however, it is important to note that the prime farmland designation is independent of current land use (USDA NRCS, 2025).

**Table 5.5.4-2 Farmland Classifications within the Preliminary Development Area**

| Farmland Classification | Preliminary Development Area (acres / %) |
|---|---|
| Prime Farmland | 318.0 / 31.7% |
| Prime Farmland if Drained | 658.8 / 65.6% |
| Farmland of Statewide Importance | 23.9 / 2.4% |

| Table 5.5.4-2 Farmland Classifications within the Preliminary Development Area | |
|---|---|
| **Farmland Classification** | **Preliminary Development Area (acres / %)** |
| Not Prime Farmland | 3.2 / 0.3% |
| **PROJECT TOTAL** | **1,004.0 / 100.0%** |
| Source: Soil Survey Staff, 2025. | |

Prime farmland within the Preliminary Development Area will be placed in a permanent cover of perennial vegetation according to seeding and management specifications as described in the Vegetation Management Plan (refer to Appendix C) to the benefit of wildlife and the soil. As discussed in Section 3.3 and the Prime Farmland Assessment in Appendix D, removing the land from agricultural production may be beneficial for limiting nitrogen infiltration into groundwater supply, thereby improving groundwater quality. Upon decommissioning, the land would be returned to its pre-construction agricultural use. Lake Charlotte anticipates that the property will be restored to agricultural use on decommissioning of the Project.

Initial post-construction revegetation efforts and maintenance of vegetation during operations and maintenance will consider selecting suitable plants, managing seeding times for late spring early summer when soil moisture is optimum for germination, use of mulch, and other BMPs. Existing tile drainage systems will be maintained during Project operations; refer to discussion in Section 5.3.1.1 regarding county-owned drain tile in the Land Control Area. Aside from the temporary impacts discussed throughout this section, the primary post-construction impact to prime farmland is that the land will not be farmed for approximately 30 years.

### 5.5.5 Surface Waters

The Land Control Area is located in the Blue Earth River watershed (HUC8: 07020009) (MDNR, 2023). The Blue Earth watershed is approximately 1,550 square miles and spans eight counties. The Blue Earth River is the Minnesota River's largest tributary by volume, contributing 46 percent of the Minnesota River's flow at the confluence with the Blue Earth River. Agricultural use is the dominant land use in the watershed (MPCA, 2024b).

#### 5.5.5.1 Lakes, Ponds, Rivers, Streams, and Ditches

Review of the MDNR Hydrography Dataset does not indicate any lakes, ponds, rivers, streams, or ditches are present within the Land Control Area (MDNR, 2025d). The nearest mapped lake or pond is 140 feet to the west of the Land Control Area. Surface water resources are depicted on Map 15.

An on-site wetland and waters delineation was conducted between October 18 and 26, 2022, to identify and characterize wetlands and waterways per U.S. Army Corps of Engineers (USACE) methodology. The delineation encompassed the entirety of the Land Control Area, as well as an area to the west of the Land Control Area, which is no longer a part of the Land Control Area contemplated for the Project. The wetland and waters survey did not identify any lakes, ponds, rivers, streams, or ditches within the Land Control Area (refer to Appendix H) (Tetra Tech, 2023). (Refer to Map 15).

#### 5.5.5.2 Minnesota Public Waters

In their Early Coordination Memo dated April 4, 2025, the MDNR notes that Charlotte, High, and Martin Lakes and two public water wetlands are adjacent to the proposed project Land Control Area. These areas provide wildlife habitat and recreational opportunities. However, the MDNR Public Waters Inventory (PWI) Basin and Watercourse Delineations dataset does not identify any MDNR PWI Basins within the Land Control Area. The two closest PWI Basins are located to the west of the Land Control Area. The MDNR PWI Basin Lake Charlotte is located approximately 150 feet west of the Land Control Area, and an unnamed MDNR PWI Basin Wetland approximately 50 feet west of the Land Control Area (MDNR, 2024e). Both of these PWI basins are shown on Map 15.

No MDNR PWI watercourses exist within the Land Control Area. The closest MDNR PWI watercourse is County Ditch 72, located approximately 160 feet to the west of the Land Control Area (MDNR, 2024e).

#### 5.5.5.3 Water Quality

There are no impaired waters within the Land Control Area (MDNR, 2024f). The nearest impaired water is approximately 1.2 miles to the northwest of the Land Control Area.

#### 5.5.5.4 Floodplains

The Federal Emergency Management Agency Flood Insurance Rate Map classifies the Land Control Area as an "Area of Minimal Flood Hazard" (Federal Emergency Management Agency, 1977). This data indicates that the Land Control Area is outside both 100- and 500-year floodplains. The closest Federal Emergency Management Agency floodplain is an area designated as Zone A (100-year) and is located approximately 150 feet to the east of the Land Control Area.

#### 5.5.5.5 Wetlands

The MDNR National Wetland Inventory for Minnesota identifies nine wetlands within the Land Control Area (MDNR, 2019). The nine wetlands are farmed wetlands and are not administered by MDNR. They are clustered in the central and south portions of the Land Control Area (refer to Map 15).

An on-site wetland and waters delineation was conducted between October 18 and 26, 2022, to identify and characterize wetlands and waterways per USACE methodology. The delineation encompassed the entirety of the Land Control Area, as well as additional areas to the west of the Land Control Area, which are no longer a part of the proposed Land Control Area as described in this Joint Application. The delineation identified 21 wetlands totaling 16.5 acres within the Land Control Area (see Table 5.5.5-1). All wetlands are associated with roadways or are located within agricultural fields, with five of the wetlands occurring along 160$^{th}$ Street, six of the wetlands occurring south of 160$^{th}$ Street within agricultural fields, three of the wetlands occurring along 210$^{th}$ Avenue, one wetland occurring along 170$^{th}$ Street, and the remaining six wetlands occurring south of 170$^{th}$ Street within agricultural fields (refer to Map 15). All identified wetlands are Palustrine Emergent (PEM) Cowardin community type and Type 1, seasonally flooded basins or

floodplains, Circular 39 wetland type (refer to Appendix H) (Tetra Tech, 2023). The wetland and waters survey did not identify any other water resources within the Land Control Area.

**Table 5.5.5-1 Delineated Wetlands within the Land Control Area**

| Wetland ID | Cowardin Classification [1] | Acres |
|---|---|---|
| WA051 | PEMAf/PEMAx | 0.20 |
| WA057 | PEMAf/PEMAx | 0.42 |
| WB068 | PEMAf | 0.36 |
| WB069 | PEMAf | 0.25 |
| WB072 | PEMAx | 0.05 |
| WB073 | PEMAx | 0.19 |
| WB079 | PEMAf | 0.38 |
| WB080 | PEMAx | 0.44 |
| WB081 | PEMAx | 0.06 |
| WB084 | PEMAf | 0.16 |
| WB085 | PEMAf/PEMAx | 5.49 |
| WB087 | PEMAf | 2.97 |
| WB088 | PEMAf | 2.75 |
| WB089 | PEMAf | 0.70 |
| WB090 | PEMAf | 0.71 |
| WB092 | PEMAf | 0.06 |
| WB095 | PEMAf | 0.11 |
| WB096 | PEMAf | 0.06 |
| WB102 | PEMAf | 0.28 |
| WB105 | PEMAf | 0.28 |
| WB109 | PEMAf | 0.59 |

[1] PEM – Palustrine Emergent; f – farmed; x – Excavated; A – Temporarily Flooded.

A Wetland Conservation Act Notice of Application and Joint Application for Delineation Concurrence was submitted to the USACE St. Paul District and the Martin County Local Government Unit (LGU), the Martin County Soil and Water Conservation District, on August 15, 2023. On August 23, 2023, the USACE stated in a response that a delineation concurrence is not necessary until design is complete and proposed impacts to aquatic resources are known. USACE suggested moving forward with the project planning and consulting with state or local authorities. No further consultation will occur with the USACE until a wetland permit application, if needed, is ready for submittal. The LGU issued a Notice of Decision on September 18, 2023, stating an LGU and Technical Evaluation Panel concurrence of the delineated aquatic resource boundaries. The Notice of Decision is valid for a five-year period. The Applicant contacted the USACE on February 24, 2025, as a follow-up to the August 2023 coordination efforts to inform the USACE the wetland boundary concurrence was received from the Martin County Soil and Water Conservation District and the proposed Project will avoid wetland impacts. The USACE concurred that no further consultation with the USACE was necessary.

### 5.5.5.6 Impacts and Mitigation Measures

The Project has been designed to minimize impacts to surface waters to the extent practicable. The proposed Preliminary Development Area contains six wetlands totaling 2.36 acres in size (refer to Table 5.5.5-2). These wetlands are located within the fenced solar facility areas of the Preliminary Development Area but will not be impacted or disturbed by installation of Project components. Therefore, all wetlands are anticipated to be avoided. These wetlands are all currently farmed and will be enhanced through seeding and management in accordance with the Project Vegetation Management Plan. Where unanticipated wetland impacts cannot be avoided, Lake Charlotte will obtain permits from the USACE and the LGU. Lake Charlotte will coordinate with both the USACE and the LGU prior to construction regarding wetland impacts. Wetland areas within the Preliminary Development Area will be vegetated with wet seed mix in accordance with the Vegetation Management Plan (refer to Appendix C) and maintained in an herbaceous state for the life of the Project. Any unanticipated temporary impacts to wetlands are not expected to affect surface water drainage or off-site wetlands.

**Table 5.5.5-2 Delineated Wetlands within the Preliminary Development Area**

| Wetland ID | Cowardin Classification [1] | Acres |
|---|---|---|
| WB068 | PEMAf | 0.36 |
| WB069 | PEMAf | 0.25 |
| WB089 | PEMAf | 0.70 |
| WB090 | PEMAf | 0.71 |
| WB092 | PEMAf | 0.06 |
| WB105 | PEMAf | 0.28 |

[1] PEM – Palustrine Emergent; f – farmed; A – Temporarily Flooded

During construction, stormwater is not expected to impact adjacent properties. Stormwater will be contained within the bounds of the construction disturbance area. As discussed in Section 4.1.5.2, a SWPPP will be developed for the Project prior to construction that will include BMPs such as silt fencing (or other erosion control devices), revegetation plans, and management of exposed soils to prevent sediment from entering into adjacent surface waters. The Project SWPPP will be submitted to the MPCA for review and approval prior to construction and Lake Charlotte will obtain coverage under the General Construction Stormwater Permit.

A permanent stormwater management system will be utilized throughout the life of the project to protect and enhance the quality of surrounding surface and sub-surface waters by removing water volume, excess nutrients, sediment, and pollutants from stormwater runoff before leaving the project site. The permanent stormwater management system will utilize natural infiltration resulting from 48 permanent stormwater basins (refer to Section 4.1.5.4) and vegetation beneath the solar panels to prevent and minimize the negative effects of stormwater runoff. Stormwater basins will be vegetated with wet seed mix in accordance with the Vegetation Management Plan (refer to Appendix C) and maintained in an herbaceous state for the life of the Project.

### 5.5.6 Vegetation

The Project is in the Minnesota River Prairie Subsection of the Prairie Parkland Province (MDNR, 2025c). In the Minnesota River Prairie Subsection, loamy ground moraine (till plain) is the dominant landform, but end moraines, and lake plains also occupy a significant area. Ground moraine topography is level to gently rolling. The steepest topography of the subsection is along the Minnesota River and on the Big Stone Moraine, which has steep kames and broad slopes.

Native vegetation at the time of the public land survey (1847-1907) in the Minnesota River Prairie Subsection consisted primarily of tallgrass prairies, with many islands of wet prairies. Forests of silver maple, elm, cottonwood, and willow grew on floodplains along the Minnesota River and other streams. Portions of the Big Stone Moraine supported dry and dry-mesic prairie. There were also dry gravel prairies on kames.

Current vegetation consists largely of row-crop agriculture. This subsection is the heart of the Minnesota corn belt. Upland prairie species are common throughout most of this subsection (based on herbarium records). Remnant stands of tallgrass prairie are rare.

Based on the NLCD land use/cover data as presented in Table 5.2.9-1, the land cover in the Land Control Area is predominately agricultural land (1,216.7 acres; 95.3 percent). Developed lands make up approximately 59.9 acres/4.7 percent of the Land Control Area. Forested land within the Land Control Area consists of small woodlots serving as a shelter belt or wind break around farmsteads and wind rows in agricultural fields and make up less than 0.1 acre (less than 0.01 percent) of the Land Control Area. In addition, based on the wetland delineation discussed in Section 5.5.5.5, there are 21 wetlands totaling 16.5 acres located within the Land Control Area. A discussion of wetland impacts is provided in Section 5.5.5.5.

#### 5.5.6.1 Impacts and Mitigation Measures

Approximately 99.4 percent (997.8 acres) of the 1,004-acre Preliminary Development Area consists of active agricultural fields, all of which will be converted from agricultural use to solar energy and battery storage use for the life of the Project. Most agricultural land within the Preliminary Development Area will be converted to open, herbaceous cover (i.e., within the racking area) with the exception of the about 30.8 acres which will be converted to impervious surfaces for the Project Substation, BESS, inverter skids, O&M building and parking lot, and access roads. The Project has been designed to avoid tree clearing.

To minimize potential Project impacts to vegetation, Lake Charlotte anticipates site restoration, seeding, establishing, maintaining, and monitoring disturbed areas and areas below the solar modules in accordance with the Vegetation Management Plan and the Agricultural Impact Mitigation Plan (refer to Appendices C and E, respectively). Control of invasive and noxious weeds will be ongoing during the construction and operation of the Project by mowing and selectively applying herbicides when applicable.

Solar sites generally utilize a shorter prairie seed mix within the panel footprint, taller prairie plantings in the open spaces between the fence and array, and a wet seed mix for wet areas including wetlands. The mixes are designed to be native and are developed with prairie specialists in coordination with the Minnesota Interagency Working Group to design a mix that will allow for

successful operation of the solar facility, promote pollinator habitat, establish stable ground cover successfully, reduce erosion, reduce runoff, and improve infiltration. Lake Charlotte's Vegetation Management Plan, including the three seed mixes, is included as Appendix C.

### 5.5.7 Wildlife and Their Habitats

#### 5.5.7.1 Avian Species

The Land Control Area is located within the Mississippi Flyway, a crucial migration route for millions of birds that migrate annually between nesting habitat and wintering habitat in North, Central and South America. Migratory birds are protected under the Migratory Bird Treaty Act (16 USC 703-711), which prohibits the taking of any migratory bird, or a part, nest, eggs, or products. Additionally, Bald and Golden Eagles are also protected under the Bald and Golden Eagle Protection Act (16 USC 668-668d) which prohibits take of an individual bird, chick, egg, or nest, including alternate and inactive nests, and prohibits disturbance that may lead to biologically significant impacts such as interference with feeding, sheltering, roosting, and breeding or abandonment of a nest.

In addition to the protections the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act provide for all migratory birds, the USFWS has also developed a list of Birds of Conservation Concern, which includes both Migratory Bird Treaty Act- and non--Migratory Bird Treaty Act-protected species, to foster proactive conservation actions by federal and state agencies and private parties by focusing first on species of concern (USFWS, 2024a). In addition, the U.S North American Bird Conservation Initiative has developed Bird Conservation Regions to "facilitate domestic and international cooperation in bird conservation" (North American Bird Conservation Initiative, 2025); each Bird Conservation Region has a list of birds present or possibly present within the region that are considered Birds of Conservation Concern.

The Land Control Area is also located within the Prairie Pothole Bird Conservation Region (Region 11) (North American Bird Conservation Initiative, 2025). The USFWS identified 34 species considered Birds of Conservation Concern within Bird Conservation Region 11. Table 5.5.7-1 provides a list of each Birds of Conservation Concern species within Bird Conservation Region 11.

**Table 5.5.7-1**
**Birds of Conservation Concern that Potentially Occur in the Land Control Area**

| Bird Conservation Region | Listed Birds | |
|---|---|---|
| | Common Name | Scientific Name |
| 11 (Prairie Pothole) | American Golden-Plover[1] | *Pluvialis dominica* |
| | Baird's Sparrow | *Centronyx bairdii* |
| | Black Tern | *Chlidonias niger* |
| | Black-billed Cuckoo | *Coccyzus erythropthalmus* |
| | Bobolink | *Dolichonyx oryzivorus* |
| | Buff-breasted Sandpiper[1] | *Calidris subruficollis* |
| | California Gull | *Larus californicus* |
| | Chestnut-collared Longspur | *Calcarius ornatus* |

**Table 5.5.7-1**
**Birds of Conservation Concern that Potentially Occur in the Land Control Area**

| Bird Conservation Region | Listed Birds | |
|---|---|---|
| | Common Name | Scientific Name |
| | Chimney Swift | *Chaetura pelagica* |
| | Clark's Grebe | *Aechmophorus clarkii* |
| | Dunlin[1] | *Calidris alpina* |
| | Eastern Whip-poor-will | *Antrostomus vociferus* |
| | Franklin's Gull | *Leucophaeus pipixcan* |
| | Golden-winged Warbler | *Vermivora chrysoptera* |
| | Grace's Warbler | *Setophaga graciae* |
| | Grasshopper Sparrow | *Ammodramus savannarum* |
| | Henslow's Sparrow | *Centronyx henslowii* |
| | Hudsonian Godwit[1] | *Limosa haemastica* |
| | LeConte's Sparrow | *Ammospiza leconteii* |
| | Lesser Yellowlegs[1] | *Tringa flavipes* |
| | Long-billed Curlew | *Numenius americanus* |
| | Long-eared Owl | *Asio otus* |
| | Marbled Godwit | *Limosa fedoa* |
| | Mountain Plover | *Charadrius montanus* |
| | Pectoral Sandpiper[1] | *Calidris melanotos* |
| | Red-headed Woodpecker | *Melanerpes erythrocephalus* |
| | Ruddy Turnstone[1] | *Arenaria interpres* |
| | Short-billed Dowitcher[1] | *Limnodromus griseus* |
| | Short-eared Owl | *Asio flammeus* |
| | Sprague's Pipit | *Anthus spragueii* |
| | Thick-billed Longspur | *Rhynchophanes mccownii* |
| | Western Grebe | *Aechmophorus occidentalis* |
| | Willet | *Tringa semipalmata* |
| | Yellow Rail | *Coturnicops noveboracensis* |

[1] (nb) non-breeding in this Bird Conservation Region.

The USFWS has established Waterfowl Production Areas to protect habitat determined essential to the breeding, resting, and nesting habitat for countless avian and other wildlife species. No Waterfowl Production Areas are within the Land Control Area.

The National Audubon Society has established Important Bird Areas. Important Bird Areas are discrete sites that provide essential habitat for one or more bird species and include habitat for breeding, wintering, and/or migrating birds (National Audubon Society, 2025). The Land Control Area is not located within or near any Important Bird Areas.

#### 5.5.7.2 Terrestrial Species

The Land Control Areas is dominated by cultivated agriculture characterized by corn and forage crop production, with the greater surrounding area consisting of agricultural buffer strips and forested areas, creating edge habitats. This mosaic of agricultural areas with adjacent edge habitats is likely to be utilized by the following species; white-tailed deer (*Odocoileus virginianus*), common raccoon (*Procyon lotor*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), American crow (*Corvus brachyrhynchos*), eastern bluebird (*Sialia sialis*), mourning dove (*Zenaida macroura*), ring-necked pheasant (*Phasianus colchicus*), wild turkey (*Meleagris gallopavo*), American toad (*Anaxyrus americanus*), and common garter snake (*Thamnophis sirtalis*) (MDNR, 2025e). Additionally, some pollinator species may be present within the Land Control Area including bees, butterflies, and moths.

#### 5.5.7.3 Aquatic Species

As discussed in Section 5.5.5.5, 21 wetlands were identified within the Land Control Area (refer to Table 5.5.5-1); no other surface water types were identified. All were classified as a Palustrine Emergent Cowardin community type and Type 1, seasonally flooded basins or floodplains, Circular 39 wetland type wetland communities. Aquatic wildlife species that may utilize these areas include muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), frog species such as leopard (*Lithobates pipiens*), green (*L. clamitans*), and mink (*L. septentrionalis*), as well as turtle and fish species and a variety of waterfowl including trumpeter swans (*Cygnus buccinator*), Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), teal (*A. carolinensis*), pintails (*A. acuta*), and others.

#### 5.5.7.4 Impacts and Mitigation

Impacts to wildlife species, including avian and Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act species are expected to be minor due to the dominance of agricultural land cover types in the Preliminary Development Area. Land uses in the Preliminary Development Area are primarily agricultural (997.8 acres/99.4 percent), and small amounts of developed areas (6.2 acres/0.6 percent). The Preliminary Development Area also has very little open water or wetlands (refer to Section 5.5.5.5). Thus, few wetland- or water-dependent wildlife species would use the Preliminary Development Area for breeding or nesting. Wildlife species associated with grasslands would also be limited or largely absent.

The small number of wildlife species that may utilize habitat within the Preliminary Development Area are likely to be habituated to human development activities. Many of these species are also highly mobile and may avoid the area during construction. During the operation of the Project, impacts are expected to be minimal as wildlife will become accustomed to operational activities similar to the current agricultural practices in the surrounding area. Less mobile species and ground-nesting birds, including eggs and chicks, may be more prone to impacts; however, impacts resulting from the construction and operation of the Project are not expected to differ from current impacts of annual farming activities.

Permanent security fencing will be installed along the perimeter of the solar arrays and Preliminary Development Area. Additional gates will be strategically installed at corners for deer egress and contact information for the site manager will be posted at the gates. The fencing around the Solar Facility will consist of an agricultural woven wire fence and will extend approximately seven feet above grade. As requested by the MDNR in their Early Coordination memo dated April 4, 2025, barbed wire will not be used around the perimeter of the Solar Facility. In place of barbed wire around the Solar Facility, one foot of three to four strands of smooth wire will be placed atop of the woven wire fence for a total height of approximately eight feet above grade. In addition, Lake Charlotte will install high-visibility markers along fencing adjacent to lakes to increase perceptibility of the wire. Gates will be strategically installed at corners for deer egress and contact information for the site manager will be posted at the gates.

The fencing around the Project Substation and the BESS will be a 6-foot above grade chain-link fence and include one foot of barbed wire on top to comply with the NESC. This fencing will be designed to prevent the public from gaining access to electrical equipment which could cause injury or death.

In their Early Coordination memo, the MDNR notes that birds may be impacted if they attempt to land on or between the panels of the array. Impacts can be minimized by using less reflective panels or non-polarizing white grids between the panels to break up the polarized reflection of light. The MDNR notes that this is particularly important given the proximity to Charlotte, High, and Martin Lakes, and neighboring wetlands. While the “lake effect” (i.e., the mistaking of solar panels for a body of water by waterfowl) has not been documented in the Midwest, Lake Charlotte will install panels with anti-reflective coating and will report unusual wildlife events at the site to the permitting authority and the DNR Regional Environmental Assessment Ecologist.

Operation and maintenance activities associated with the Project are not expected to have any impacts beyond those associated with construction as described above. As noted above, the wildlife and avian species in this area are habituated to human activities associated with agricultural practices, and impacts associated with routine operations and maintenance are not expected to differ from those related to routine farming activities.

The restoration of the area following construction may provide more wildlife habitat than what is currently available under the current land use regime. Lake Charlotte will restore the area within the fence line of the Solar Facility with a seed mix that will provide more suitable habitat for wildlife, including grassland birds, rodents, reptiles, and insects. While 37.5 acres within the Preliminary Development Area would be converted to impervious surfaces (i.e., access roads, collector substation and O&M building, BESS, and inverters) and would not serve as wildlife habitat during operations, 966.3 acres would be restored as herbaceous cover, including a seed mix with some native plants, thereby potentially benefitting and increasing the overall populations of wildlife species in the area, including birds, small mammals, reptiles, and pollinator insects.

The Project has been designed to avoid adverse impacts to quality habitat to the greatest extent possible. Lake Charlotte will utilize BMPs to stabilize, protect, and mitigate potential impacts to species’ habitat. These BMPs will be implemented during construction, post-construction, and operational phases of the Project. No species-specific mitigation is proposed as all potential impacts to wildlife are expected to be minimal and insignificant.

### 5.5.8 Rare and Unique Natural Resources

The USFWS maintains the Information for Planning and Conservation (IPaC) website to inform project proponents of the potential for federally endangered, threatened, proposed, and candidate species and designated critical habitat to be present within one mile of the Land Control Area. Similarly, the MDNR maintains the Natural Heritage Information System database through their Natural Heritage Program and Nongame Game Research Program; the Natural Heritage Information System is the most complete source of data on Minnesota's threatened and endangered species, as well as ecologically significant areas, native plant communities, and other rare natural features.

Lake Charlotte reviewed both the Information for Planning and Conservation website and the Natural Heritage Information System database to ensure compliance with federal and state regulations regarding protected species. Although these reviews do not represent a comprehensive survey, they provide information on the potential presence of rare and unique species and habitats.

The Natural Heritage Information System review was conducted for documented occurrences of federally listed species and state-listed species within one mile of the Land Control Area. The Natural Heritage Information System information provided here is based on a query of licensed Natural Heritage Information System data (per MDNR license agreement) (MDNR, 2025f). In addition, a Natural Heritage Review Request to the MDNR was submitted via the MDNR's Minnesota Conservation Explorer online tool on March 11, 2025; a final report was generated by Minnesota Conservation Explorer on March 11, 2025, is summarized below and is included in Appendix A.

A Conservation Planning Report for the Project was also requested through Minnesota Conservation Explorer to determine the presence and potential impacts to MDNR High Value Areas. Results of this review are summarized below and the report is included in Appendix A.

#### 5.5.8.1 Federally Listed Species

According to the IPaC review, the following species have been identified as potentially present in the Land Control Area (refer to Table 5.5.8.-1) (USFWS, 2025a). Designated critical habitat is not present in the Land Control Area.

**Table 5.5.8-1 Federally Listed, Proposed, and Candidate Species Potentially Present in the Land Control Area**

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Argynnis idalia occidentalis* | Western Regal Fritillary | Proposed Threatened |
| *Danaus plexippus* | Monarch butterfly | Proposed Threatened |

**Western Regal Fritillary**

The regal fritillary is a strong-flying, non-migratory butterfly with a wingspan up to four inches. The species is found in native tallgrass prairie habitats and was once commonly found in 32 states extending north in New England, south to Oklahoma, and west to Colorado. Today, the Western subspecies is found in portions of Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin, and Wyoming. Regal

fritillaries can range widely with females potentially traveling up to 100 miles searching for three main habitat components: violet hostplants for larvae, nectar plants for adults, and native grasses to provide protection throughout the life cycle. Adults can be found foraging in both upland and wet prairie habitats; however, habitat can only be considered suitable for all life stages if violet species are present to provide shelter and forage for larvae. The density of violets seems to correlate positively to the number of butterflies within a given area. Habitat alteration has reduced the species' range and abundance (USFWS, 2024b).

Adults mate once annually in mid to late summer; however, females undergo reproductive diapause until fall. Eggs hatch in about 3 to 4 weeks and then larvae quickly seek duff material where they overwinter. When active in spring, larvae begin feeding on young violets. Mortality is high during the larvae stage. After a 2 to 4-week pupae stage in late spring, adults emerge in early summer. Dispersal of adults may be driven by localized threats or poor habitat conditions and success is dependent upon connectivity of suitable habitat, availability of nectar sources, and habitat patch sizes among other factors (USFWS, 2024b).

On August 6, 2024, the USFWS published a proposed rule listing the western regal fritillary as federally threatened under the Endangered Species Act with protective regulations issued under section 4(d) of the Act. Proposed species are not protected under the Endangered Species Act, and as such, a determination of effect is not applicable. However, federal agencies are required to confer with the USFWS on agency actions that may be likely to jeopardize a proposed species (USFWS, 2025b).

**Monarch Butterfly**

The monarch butterfly is a large butterfly with an approximate 3- to 4-inch wingspan and characterized by bright orange coloring on the wings, with distinctive black borders and veining. The species can be found in a wide variety of habitats including prairies, grasslands, urban gardens, road ditches, and agricultural fields, provided a supply of nectar plants are available for adult foraging and milkweed plants are present for laying eggs and as a food source for caterpillars (USFWS, 2025c).

On December 17, 2020, the USFWS published the result of their 12-month review of the monarch butterfly and determined that listing the species under the Endangered Species Act was warranted but precluded. The species meets the criteria for listing as an endangered or threatened species, but the USFWS cannot currently implement the listing due to limited staff and/or funding and because there are other listing actions with a higher priority. On December 12, 2024, the USFWS published a proposed rule to the federal register to list the monarch as threatened with a 4(d) rule (USFWS, 2024c). A final rule is expected to be published to the federal register in 12 months, and the listing made effective 30-60 days later (i.e., January or February 2026). Proposed species are not protected under the Endangered Species Act, and as such, a determination of effect is not applicable. However, federal agencies are required to confer with the USFWS on agency actions that may be likely to jeopardize a proposed species.

#### 5.5.8.2 State Listed Species

There are no documented occurrences of state-listed species within one mile of the Land Control Area per the Minnesota Conservation Explorer review (refer to Appendix A).

#### 5.5.8.3 MDNR High Value Areas

The MDNR recommends identifying high value natural resources prior to development of a project. High value resources include but are not limited to:

- state-listed species;
- Minnesota Biological Survey sites of biodiversity significance, MDNR native plant communities, and Native Prairie;
- wetlands, calcareous fens, shorelands, floodplains, and PWIs;
- Minnesota Wildlife Action Plan Species and Wildlife Action Network;
- public conservation and recreation lands; and
- large block and other important habitats, including conservation easements.

State-listed species are discussed in Section 5.5.8.2; shorelands, floodplains, public waters, and wetlands are discussed above in Section 5.5.5; and public lands are discussed in Section 5.2.10. Based on a review of MDNR data and the Minnesota Conservation Explorer Conservation Planning Report (refer to Appendix A), the remaining high value natural resource areas are discussed below and shown in Map 16.

**Native Plant Communities**

Using a variety of methods including desktop review, aerial surveys, and follow-up field-based survey efforts, MDNR's Minnesota Biological Survey evaluates landscapes in Minnesota for intact ecological communities, rare plant and animal species, and native plant communities. The most recent classification effort was in 2003; this version is strongly based on plant species composition and was developed using extensive data from sample plots throughout the state from a variety of habitat types including wetlands, forests, prairies, and others.

A biodiversity significance rank is assigned to each site (these are subsequently referred to as sites of biodiversity significance). Rankings are based on the proximity of site to other intact sites or isolation within agricultural, urban, or other disturbed areas (i.e., the landscape context), presence of rare species populations and the presence/extent of native plant communities. Sites are ranked as outstanding, high, moderate, and below; the Minnesota Biological Survey ranking process allows for prioritization of sites for conservation and guides management and monitoring efforts (MDNR, 2025g).

Based on review of the MDNR native plant community data, there are no native plant communities within the Land Control Area.

## Native Prairie

The MDNR defines native prairie as areas dominated by native prairie vegetation including grasses and forbs, as well as wildlife endemic to these areas (MDNR, 2025h). Typically, they are found in areas of the state where the sod has never been broken. Native prairie as defined or mapped by the MDNR is not present in the Land Control Area.

The MDNR also has identified native prairie remnants that occur along railroad rights-of-way (MDNR, 2025i). The 1997 Minnesota State Legislature instructed the MDNR to inventory railroad lines in the state to identify native prairie that may be associated with the railroad right--of--way. Railroad rights-of-way are ranked by the MDNR as very good, good, and fair. MDNR -mapped railroad prairie rights-of-way are not present in the Land Control Area.

## Calcareous Fens

Calcareous fens are rare wetlands dependent on a persistent source of calcium-rich groundwater. These areas support unique plant communities that are highly sensitive to changes in both groundwater quality and quantity (MDNR, 2025j). Reductions in groundwater upwelling rates changes in surface water can damage fen condition and/or extent, in some cases irreparably. Based on review of MDNR's data, there are no calcareous fens within 5 miles of the Land Control Area.

## Minnesota Wildlife Action Plan and Wildlife Action Network

Minnesota's State Wildlife Action Plan (2015-2025) aims to address the primary issues facing Minnesota's Species of Greatest Conservation Need including habitat loss, degradation, and fragmentation, biological factors such as low reproduction, poor dispersal ability, disease, or overexploitation, and the impacts of climate change (MDNR, 2025k). Species of Greatest Conservation Need are native species with rare, declining, or vulnerable populations. All state and federally listed species that occur in Minnesota are automatically listed as Species of Greatest Conservation Need.

The State Wildlife Action Plan defines actions that can be taken to prevent further population decline, resulting in the need to list these species under state endangered species or federal Endangered Species Act regulations.

The Wildlife Action Network is a spatial dataset developed by the MDNR to assist in developing and focusing conservation efforts for species identified in the State Wildlife Action Plan (MDNR, 2025l). The Wildlife Action Network is comprised of 10 GIS data layers that represent terrestrial and aquatic habitats across the state that support Species of Greatest Conservation Need. These include lakes of biological significance, rivers and streams with high biological integrity, and high conservation value forests. Wildlife Action Network ranks areas based on the quality of terrestrial and aquatic habitats, using five of the data layers to assess biological significance, surveys, conservation efforts, lakes, and stream indices, ultimately prioritizing areas for conservation actions.

The closest Wildlife Action Network mapped area is located adjacent to the western boundary of the Land Control Area. Approximately 0.26 acre overlaps the area within the fenceline of the Preliminary Development Area; this area is ranked by the Wildlife Action Network as

low--medium. However, based on a review of current aerial imagery in this area, it appears that the creation of the Wildlife Action Network polygon is based on coarser datasets and is not digitized according to land cover types visible in aerial imagery. The area of the polygon within the Preliminary Development Area appears to be cultivated agricultural land and therefore should not be included within the Wildlife Action Network polygon.

**Large Block Habitats and Conservation Easements**

Large, contiguous blocks of habitat, such as forests or grasslands, can provide foraging, denning, and breeding habitats for species requiring greater separation from anthropogenic development. These areas often include more complex ecological communities, which may lead to an increased diversity of species, and larger and more resilient species populations. Construction of a project within large block habitats may increase habitat loss and fragmentation, which is counterproductive to area-sensitive species for feeding, breeding, and sheltering. No large block habitats are present in the Land Control Area.

A review of the Reinvest in Minnesota Reserve Program mapper did not identify any conservation easements within the Land Control Area.

#### 5.5.8.4 Impacts and Mitigation Measures

**Federally Listed Species**

Field-based surveys to identify suitable habitat for monarch butterflies and regal fritillary were not conducted; however, some adult foraging habitat for both species is likely present in some portions of the Preliminary Development Area, as is monarch larval foraging habitat containing milkweed.

The IPaC website will be reviewed again prior to the start of construction to ensure the species list remains current. If federally listed species are identified through these reviews as potentially present in the vicinity of the Land Control Area, Lake Charlotte will work with the USFWS to develop avoidance and minimization measures to ensure Project activities will not result in unauthorized take of federally listed species.

**State Listed Species**

There are no documented occurrences of state-listed species within one mile of the Land Control Area per the Minnesota Conservation Explorer review (refer to Appendix A).

Lake Charlotte will conduct an updated review of the Minnesota Conservation Explorer system prior to the start of construction to ensure that no records of federal or state protected species are present within the Land Control Area.

**MDNR High Value Areas**

The Project will not have impacts on state-listed species, as discussed above. Shorelands, floodplains, public waters, and wetlands are discussed above in Section 5.5.5; and public lands are discussed in Section 5.2.10. There are no additional MDNR high value areas in the Land Control Area, including Minnesota Biological Survey sites of biodiversity significance, and native plant

communities, native prairie, calcareous fens, State Wildlife Action Plan species, large block habitats, or conservation easements.

The overlap with the Wildlife Action Network area noted during desktop review appears to be a digital data error; review of aerial imagery shows that land cover in the overlap area is cultivated agricultural land and construction activities would not impact the elements the Wildlife Action Network prioritizes for conservation. As such, impacts on MDNR high value areas will be avoided and no mitigative measures are proposed.

## 5.6 Unavoidable Impacts

Lake Charlotte developed the Land Control and Preliminary Development Areas to avoid impacting environmental resources whenever possible. In some cases, impacts on environmental resources could not be entirely avoided, but could be minimized by implementation of mitigation measures. A detailed discussion of the environmental impacts of the proposed Project, as well as the mitigation measures that would be used to minimize impacts is presented in Sections 5.1 through 5.5 of this Joint Application. Environmental impacts that would be minimized by the use of mitigation measures, but not entirely avoided are provided below. Most of these unavoidable impacts would occur during construction of the Project and would resolve when construction is complete.

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

- noise emitted from vehicles and equipment during construction that will be audible to neighboring landowners;
- increased traffic on roads surrounding and bisecting the Land Control Area;
- minor air quality impacts due to fugitive dust;
- temporary impacts to wetlands present in the Preliminary Development Area;
- potential for soil erosion; and
- disturbance to and temporary displacement of some species of wildlife.

Unavoidable impacts related to the Project that would last as long as the life of the Project would include:

- changes to the existing aesthetics of landscape (from agrarian to solar and BESS facilities), which will be visible from residences and local roadways;
- changes in land use and vegetation from agricultural land of predominately corn and soybeans to a solar facility with herbaceous vegetation underneath and around the Preliminary Development Area; and
- changes in land use from agricultural land to industrial use and introduction of impervious surfaces for operation of the BESS facility.

No additional mitigation measures are proposed for the Project beyond those discussed in Sections 5.1 through 5.5. The potential costs of implementing these mitigation measures have been incorporated into the overall cost of Project development as presented in Section 2.3.

## 5.7 Irretrievable and Irreversible Impacts

An irretrievable commitment of resources refers to the use or consumption of resources in a way that is neither renewable nor recoverable for later use by future generations. The commitment of resources refers primarily to the use of nonrenewable resources such as fossil fuels, water, and other materials (e.g., aggregate minerals, steel/metals).

Construction of the Project would require the use of fossil fuels for electricity (portable generators) and for the operation of construction and personnel vehicles and equipment. Use of raw building materials for construction would be an irretrievable commitment of resources from which these materials are produced, excluding those materials that may be recycled at the end of the Project's life cycle. The use of water for dust abatement during construction activities would also be irreversible. In addition, the commitment of labor and fiscal resources to develop and build the Project is considered irretrievable.

## 5.8 Cumulative Potential Effects

Cumulative impacts on environmental resources can occur if the impacts of one activity overlap either geographically or temporally with other activities, thereby resulting in cumulatively greater impacts on a particular area or important resource.

Review of the MNDOT District 7 planned projects did not identify any proposed projects that would overlap either geographically (i.e., within the Land Control Area) or temporally (i.e., during the anticipated period of construction) with the Lake Charlotte Project (MNDOT, 2025c). The nearest District 7 project under construction is Highway 93 near Henderson, which is approximately 70 miles northeast of the Project and scheduled for completion in 2026. The nearest proposed MNDOT project is the reconstruction of Highway 169 in Elmore involving the repaving and other improvements to the highway from East Polton Street to the Minnesota/Iowa border. The proposed project is tentatively planned for 2028 construction. The proposed project is approximately 31 miles southeast of the Project.

Information regarding planned county highway and bridge projects for 2025 is not available on the Martin County Highway Department website (Martin County, 2025b). The City of Fairmont, which is located to the south of the Land Control Area will be reconstructing Lake Avenue from Bixby Road/CSAH39 to Fairlakes Avenue (City of Fairmont, MN, 2025b). The reconstruction project is located west of the city approximately 5.8 miles from the southern limits of the Land Control Area; therefore, the reconstruction project will not overlap geographically with the proposed Project.

Energy Environmental Review and Analysis is currently reviewing the North Crescent Solar and Storage Project, a proposed 150 MW solar energy generation facility and 50 MW energy storage facility, located in Faribault County (Minnesota DOC, 2025). The North Crescent Solar and Storage Project is approximately 15 miles to the east of the proposed Project; therefore, the North

Crescent Solar and Storage Project would not overlap geographically with the proposed Lake Charlotte Project. According to the Environmental Assessment prepared for the Northern Crescent Solar and Storage Project, project construction is anticipated to begin in 2025 and be complete by late 2026. Therefore, the Northern Crescent Solar and Storage Project and the Lake Charlotte Project would not overlap temporally, as construction for the Lake Charlotte Project is not anticipated to begin until 2027.

No other proposed projects have been identified through coordination with other state, county, and local agencies that would overlap geographically or temporally with the proposed Project and results in cumulative impacts on human settlement and environmental resources in the Project Study Area.

# 6.0 AGENCY AND STAKEHOLDER OUTREACH

Lake Charlotte conducted early outreach to solicit feedback from federal, tribal, state, and local government agencies and other stakeholders in support of this Joint Application. This early engagement provided Lake Charlotte with valuable insight into landowner, agency, and Tribal Nation preferences regarding development of Project facilities.

Table 6.0-1 identifies agencies, Tribal Nations, and stakeholders that were contacted through meetings or a notification letter and the date that responses were received, or meetings were held. The Project notification letter to agencies was sent on January 23, 2025. Lake Charlotte contacted Tribal Nations separately from the Project notification mailing to agencies. The mailing to Tribal nations was sent on September 5, 2024, and included a request for Tribal Resources of Interest in Martin County, Minnesota to solicit input on any areas of interest to the Tribal Nations that should be considered in Project design and in this Joint Application.

Representative letters from the Project notification and Tribal Nation mailings, as well as copies of any responses received to date are provided in Appendix A and summaries of responses received are provided in Sections 6.1 through 6.5.

**Table 6.0-1 Lake Charlotte Agency and Stakeholder Correspondence**

| Agency | Response Date (Type) |
|---|---|
| **Federal** | |
| U.S. Army Corps of Engineers – St. Paul District | Response August 25, 2023<br>Response February 19, 2025<br>Resolved February 24, 2025 |
| U.S. Fish and Wildlife Service – Minnesota-Wisconsin Ecological Services Field Office | IPaC report and auto response March 19, 2025 |
| Federal Aviation Administration | Notice Criteria Tool March 7, 2025 |
| **Tribal Nations** | |
| 1854 Treaty Authority | No response to date. |
| Bois Forte Band of Chippewa | No response to date. |
| Fond du Lac Band of Lake Superior Chippewa | No response to date. |
| Grand Portage Band of Lake Superior Chippewa | No response to date. |
| Leech Lake Band of Ojibwe | No response to date. |
| Lower Sioux Indian Community | No response to date. |
| Mille Lacs Band of Ojibwe | No response to date. |
| Minnesota Chippewa Tribe | No response to date. |
| Prairie Island Indian Community | No response to date. |
| Red Lake Nation | No response to date. |
| Shakopee Mdewakanton Sioux Community | Response September 10, and 11, 2024 |
| Upper Sioux Community | Response October 8, 2024 |
| White Earth Nation | No response to date. |
| White Earth Reservation Business Committee | No response to date. |

| Table 6.0-1 Lake Charlotte Agency and Stakeholder Correspondence | |
|---|---|
| **Agency** | **Response Date (Type)** |
| Minnesota Indian Affairs Council | No response to date. |
| **State** | |
| Minnesota Department of Commerce – Energy Environmental Review and Analysis | Meeting February 27, 2025<br>Draft Application Submitted for Preliminary Completeness Review April 11, 2025<br>Preliminary Completeness Response Received May 9, 2025<br>Size Determination Request April 11, 2025<br>Response to Size Determination Request April 15, 2025 |
| Minnesota Public Utilities Commission | Meeting February 27, 2025 |
| Minnesota Department of Agriculture | Meeting March 13, 2025<br>Response to Agricultural Impact Mitigation Plan Review May 8, 2025 |
| Minnesota Department of Transportation | Initial Response February 4, 2025 and Response following Project Layout Map March 25, 2025 |
| Minnesota Department of Natural Resources (MDNR)– Region 4 (Southern Region), Region Environmental Assessment Ecologist | Meeting February 21, 2025<br>Early Coordination Memo April 4, 2025 |
| MDNR – Energy Projects, Planner's Office | Meeting February 21, 2025 |
| MDNR – Natural Heritage Review Request | Final Minnesota Conservation Explorer Report March 11, 2025 |
| Minnesota Historical Society – State Historic Preservation Office | No response to date. |
| Office of the State Archaeologist | No response to date. |
| Minnesota Pollution Control Agency | No response to date. |
| Minnesota Department of Employment and Economic Development | No response to date. |
| Minnesota Department of Health | No response to date. |
| Minnesota Department of Public Safety | No response to date. |
| **County** | |
| Martin County Board of Commissioners, District 1 | No response to date. |
| Martin County Board of Commissioners, District 2 | No response to date. |
| Martin County Board of Commissioners, District 3 | No response to date. |
| Martin County Board of Commissioners, District 4 | No response to date. |
| Martin County Board of Commissioners, District 5 | No response to date. |
| Martin County Economic Development Authority | No response to date. |

| Table 6.0-1 Lake Charlotte Agency and Stakeholder Correspondence | |
|---|---|
| **Agency** | **Response Date (Type)** |
| Martin County Soil and Water Conservation District | Distributed Wetland Conservation Act Notice of Application August 22, 2023<br>Response Wetland Conservation Act Notice of Determination September 18, 2023 |
| **Local Government Units** | |
| City of Northrop | No response to date. |
| Rutland Township | No response to date. |
| Fairmont Area Chamber of Commerce Meeting | January 21, 2025 |
| **Other Interested Parties** | |
| International Union of Operating Engineers (IUOE) and the Carpenters' Union | Meeting March 10, 2025 |
| Laborers' International Union of North America | Meeting March 12, 2025 |

## 6.1 Federal Agencies

### 6.1.1 U.S. Army Corps of Engineers

On behalf of the Applicant, Tetra Tech submitted a Joint Application for Delineation Concurrence to the USACE on August 15, 2023, and provided shapefiles of identified wetland, streams, ponds, lakes and natural resource features. On August 23, 2023, the USACE stated in a response that a delineation concurrence is not necessary from USACE until design is complete and proposed impacts to aquatic resources are known. USACE suggested moving forward with the project planning and consulting with state or local authorities. No further consultation will occur with the USACE until a wetland permit application, if needed, is ready for submittal. The Applicant contacted the USACE on February 24, 2025, as a follow-up to the August 2023 coordination efforts to inform the USACE the wetland boundary concurrence was received from the Martin County Soil and Water Conservation District and the proposed Project will avoid wetland impacts. The USACE concurred that no further consultation with the USACE was necessary.

### 6.1.2 U.S. Fish and Wildlife Service

The Applicant submitted the Project to the IPaC website on March 19, 2025, to understand the potential for federally endangered, threatened, proposed, and candidate species and designated critical habitat to be present in proposed Land Control Area. A description of the IPaC results and recommendations is provided in Section 5.5.8.1.

### 6.1.3 Federal Aviation Administration

Lake Charlotte used the FAA Notice Criteria Tool on March 7, 2025, to determine the need for filing 7460-1 Notice of Proposed Construction forms. The results indicated the Project does not exceed the Notice Criteria. As such, Project facilities will not exceed obstruction standards and

would not be a hazard to air navigation. Further consultation with the FAA was not necessary. No mitigation measures are anticipated or proposed for air traffic.

## 6.2 Tribal Nations

### 6.2.1 Shakopee Mdewakanton Sioux Community

Lake Charlotte received two responses from the Shakopee Mdewakanton Sioux Community on September 10 and 11, 2024. The response on September 10, 2024, was from Bill Rudnicki, Tribal Administrator, noting that Leonard Wabasha, Tribal Historic Preservation Officer (THPO), would respond on behalf of the Shakopee Mdewakanton Sioux Community. Mr. Rudnicki further noted that the Project is closer to the Upper and Lower Sioux Indian Communities. Mr. Wabasha responded on September 11, 2024, and noted that the Shakopee Mdewakanton Sioux Community will defer to the Lower Sioux Indian Community THPO regarding consultation for this Project. No additional responses from the Shakopee Mdewakanton Sioux Community have been received to date.

### 6.2.2 Upper Sioux Community

Samantha Odegard, THPO for the Upper Sioux Community, responded on October 8, 2024, and requested to be notified if any rediscovered cultural resources or human remains are identified as a result of the cultural resources surveys or as a result of ground disturbance during construction.

## 6.3 State Agencies

### 6.3.1 Minnesota Department of Commerce, Energy Environmental Review and Analysis and Minnesota Public Utilities Commission

The Applicant met with Energy Environmental Review and Analysis (Raymond Kirsch) and Commission representatives (Bret Eknes and Sam Lobby) on February 27, 2025, to introduce the Project and discuss the schedule for filing this Joint Application. General questions about the Project and Joint Application schedule and submittal date were discussed. It was noted that a second review of the draft may be required after the new Minnesota Energy Infrastructure Permitting Act regulations are in effect after July 1, 2025. Mr. Eknes inquired about notifications to Tribes, residents and governmental agencies. Both agencies noted safety at the solar facility and BESS is an important topic and should be discussed, along with a BESS Augmentation Plan. No additional concerns were discussed during the meeting.

Lake Charlotte submitted a draft of the Joint Application to the Energy Environmental Review and Analysis unit for a preliminary completeness review on April 11, 2025. The Energy Environmental Review and Analysis unit comments were received on May 9, 2025, and the comments and recommendations have been incorporated into this Joint Application.

Lake Charlotte submitted a Size Determination Request for the Project to the Energy Environemtal Review and Analysis unit on April 11, 2025. The Energy Environmental Review and Analysis unit responded on April 15, 2025, confirming that the Project is not associated with other planned

projects in a way that would require them to be combined into a single project. Minnesota Department of Agriculture

The Applicant met with Steve Roos from MDA on March 13, 2025, to introduce the Project. The Applicant affirmed that both the Solar Facility and BESS will be included in the Agricultural Impact Mitigation Plan. The MDA will review the Solar Facility and the BESS together regardless of whether they require separate permits. A discussion of drainage systems and maintenance occurred. It was noted that the Applicant will incorporate design measures to maintain adequate drainage. The MDA also stated that the Agriculture Impact Mitigation Plan should reference an environmental monitor rather than an agricultural monitor in order to align with expected permit conditions.

The Draft Agricultural Impact Mitigation Plan was submitted to MDA for review on April 23, 2025. MDA responded on May 8, 2025, and noted it had no edits to the plan. MDA further commented that MPUC is developing a new standard condition for site permits that addresses the requirements from various agencies to have an Environmental Monitor on site during construction. No updates are needed to the Environmental Monitoring section of the Agricultural Impact Mitigation Plan at this time, but MDA noted it intends to align its monitoring requirements with MPUC's new site permit requirement. Copies of correspondence with MDA are available in Appendix A.

### 6.3.2 Minnesota Department of Natural Resources

The Applicant submitted a Natural Heritage Review Request to the MDNR via the MDNR's MCE online tool on March 11, 2025; a final report was generated by MCE on March 11, 2025. The findings from the review are summarized in Section 5.5.8.2 and copies of correspondence with MDNR are included in Appendix A.

The Applicant met with Ms. Haley Byron and Mr. Martin Donavan with MDNR on February 21, 2025, to introduce the Project. During the meeting, Ms. Byron noted that preliminary review of the Project did not reveal any state species, habitats or communities of concern. Additionally, the Applicant noted the Project is primarily within agricultural land and tree removal and wetland impacts are avoided by the Project. The Applicant mentioned Project boundary follows parcel lines for the most part and is in the vicinity of a chain of lakes but not immediately adjacent. The proposed Project complies with Martin County setbacks, including a structures setback of 200 feet from the ordinary high water line of lakes. MDNR recommended compliance with the new MDNR *Prairie Establishment and Maintenance Technical Guidance for Solar Projects* (MDNR, 2025m) and that the Vegetation Management Plan will be reviewed by MDNR Energy Planner as part of the Vegetation Management Plan Working Group.

On April 4, 2025, the MDNR submitted an Early Coordination Memo with comments related to potential impacts to state resources and design considerations to minimize these impacts. A copy of this correspondence is included in Appendix A.

### 6.3.3 Minnesota Department of Transportation

Lake Charlotte notified Stacy Kotch Egstad from MNDOT on January 23, 2025, to introduce the Project. Ms. Kotch Egstad replied on February 4, 2025, to request shapefiles and design plans of the Project design to assess potential impacts upon State Trunk Highway when available. On February 25, 2025, Lake Charlotte notified Ms. Kotch Egstad that the proposed Project does not involve points of access from State Highway 15 and all entrances are sited on Martin County roads. Lake Charlotte provided the requested design information on March 19, 2025. Ms. Kotch Egstad replied on March 25, 2025, following review of the Project Layout Map and confirmed the Project does not appear to directly impact MNDOT Trunk Highway and requested the opportunity to review/conduct the appropriate district and resource group staff coordination for any potential changes resulting in Trunk Highway right-of-way impacts due to access or gen-tie colocation. Additionally. MNDOT noted the water basins in close proximity to the Trunk Highway may warrant a modeling review by the District 7 Hydraulics Engineer to ensure the proposed work will not change the peak runoff rates to the Trunk Highway right-of-way and determine if a drainage permit from MNDOT would be required. Ms. Kotch Egstad stated that if State Trunk Highway 15 is utilized for hauling of Project equipment, an Oversize/Overweight permit may be required. Additionally, the response noted that work within the right-of-way of Trunk Highway near the corner of Trunk Highway 15 and 170th Street, if necessary, would require a review by MNDOT's Office of Environmental Stewardship Cultural Resources Unit. A copy of the correspondence is included in Appendix A.

## 6.4 Martin County and Local Government Units/Stakeholders

### 6.4.1 Martin County

Lake Charlotte presented Project information during the Martin County Board meeting on November 11, 2024. In addition to the Board of Commissioners, multiple representatives from Martin County were in attendance. After presenting information about the Project, Lake Charlotte addressed any questions or concerns the county may have about the development of the Project.

Martin County identified county-maintained drain tiles are present in the Project's Land Control Area. Lake Charlotte anticipates submitting petitions to Martin County to abandon or realign portions of the public drain tile within the Project Area with the support of landowners. Public drain tile that is not abandoned will be properly buffered. County representatives also noted that road use agreements will be necessary for the Project.

Lake Charlotte provided the Martin County Board with an update of the Project's progress and spoke with the Martin County Engineer. Lake Charlotte will work with the county to develop public drain tile and road use agreements for the Project; these agreements will be executed prior to the start of construction.

Lake Charlotte representatives met with multiple Martin County departments and staff on May 13, 2025. Lake Charlotte discussed Project design and anticipated permitting schedule with Martin County Planning Zoning Director and District 5 County Commissioner. A possible abandonment petition was discussed with Martin County Drainage Systems Managers and the Martin County

Assessor. Lake Charlotte discussed Project design, access points, and construction traffic with the Martin County Engineer. Plans to review a Road Use and Maintenance Agreement were made with the County Engineer.

### 6.4.2 Martin County Soil and Water Conservation District

On behalf of the Applicant, Tetra Tech submitted a Wetland Conservation Act Notice of Application and Joint Application for Delineation Concurrence to the Martin County LGU, the Martin County Soil and Water Conservation District, on August 15, 2023. The LGU has the responsibility of coordinating with the Technical Evaluation Panel to ensure compliance with the Wetland Conservation Act and the Minnesota Board of Soil and Water Resources. The LGU distributed the Wetland Conservation Act Notice of Application and Joint Application for Delineation Concurrence to the Technical Evaluation Panel on August 22, 2023. A Notice of Decision was received on September 18, 2023, stating an LGU and Technical Evaluation Panel concurrence of the delineated aquatic resource boundaries (refer to Appendix A). The Notice of Decision is valid for a five-year period.

### 6.4.3 Town of Northrop

On December 5, 2024, Lake Charlotte and several participating landowners attended the regular meeting of the Northrop Town Council. The Project was introduced to the Northrop Town Council and a tentative planning schedule was laid out toward a Project construction period in 2027, if all goes well with the state permit. Questions and answers followed.

### 6.4.4 Rutland Township

On November 13, 2024, Lake Charlotte and several participating landowners visited the Township Board meeting to introduce the project and tentative timeline. Some participating landowners invited their neighbors to the meeting. Several rounds of questions were addressed and a discussion of what construction would look like, as well as how the completed Project would be different from the standard row crop process, were discussed.

### 6.4.5 Fairmont Area Chamber of Commerce

Lake Charlotte met with the Fairmont Area Chamber of Commerce Agriculture Committee on January 21, 2025, to introduce the Project and answer any questions they may have about the Project. Members of the agriculture industry were present with most of the discussion focused on land use, construction impacts, and tax revenue.

## 6.5 Other Interested Parties

### 6.5.1 Laborers' International Union of North America

Lake Charlotte met with Kevin Pranis, representative for the Laborers' International Union of North America (LIUNA) on March 12, 2025, to introduce the Project, provide a general overview of the anticipated construction schedule, and answer any questions the union may have about the Project development and permitting process. At this meeting, Lake Charlotte explained that an Engineering, Procurement, and Construction contractor has not been selected for the Project. Mr.

Pranis expressed the LIUNA support for renewable energy projects in Minnesota. LIUNA looks forward to continuing the conversation about labor sourcing as Project development advances.

### 6.5.2 International Union of Operating Engineers and Carpenter's Union

Lake Charlotte met with Charles Sutton, representative for the International Union of Operating Engineers and the Carpenters' Union on March 10, 2025 to introduce the Project, provide a general overview of the anticipated construction schedule, and answer any questions the unions may have about the Project development and permitting process. At this meeting, Lake Charlotte explained that an Engineering, Procurement, and Construction contractor has not been selected for the Project. Mr. Sutton expressed the International Union of Operating Engineers and Carpenter's Union broad support for renewable energy projects in Minnesota and noted they look forward to continuing the conversation about labor sourcing as Project development advances.

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